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PATENT ABSTRACTS OF JAPAN

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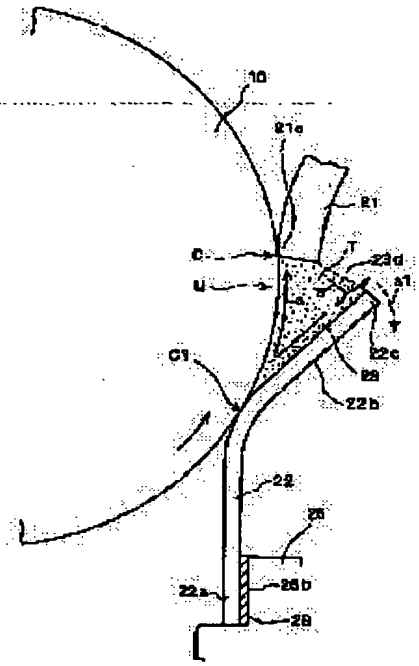
(54) IMAGE FORMING DEVICE

(57)Abstract:
PROBLEM TO BE SOLVED: To hardly cause turn-up of a blade even in the case that the contact pressure and/or the contact angle of a cleaning blade is increased.
SOLUTION: This image forming device is provided with the blade 21 to scraped off toner remaining on an image carrier 10 which is a rotary body to carry a toner image after the toner image on the image carrier 10 is transferred while coming into contact with the surface of the image carrier 10 and a scoop sheet 22 to scoop the toner scraped off by the blade while coming into contact with the image carrier on a lower side than the contact part C of the image carrier and the blade, and the top part 22c of the scoop sheet is extended by having an interval with an image carrier surface, and a toner storing part by which the toner scraped off by the blade is always heaped at the contact part C of the image carrier and the blade and a part U right under the part C is formed of an extended part 22b.



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CLAIMS

[Claim(s)]
[Claim 1] Image support which is the body of revolution which supports a toner image A cleaning blade which scratches a toner which remains on image support after contacting a front face of this image support and imprinting a toner image on image support Rather than the contact section of image support and a cleaning blade, it sets caudad, image support is contacted, a toner scratched by said cleaning blade is scooped up and scooped up, and it is a sheet. It is image formation equipment equipped with the above, and it saves, and a point of a sheet separates a gap from an image support front face, and is installed, and it is characterized by forming toner **** on which this installation section makes the contact section and its direct lower part of said image support and cleaning blade always deposit said toner scratched by said cleaning blade.
[Claim 2] Image formation equipment according to claim 1 characterized by preparing said supporter material which saves and supports a sheet towards an image support side [near the contact section with said image support], and being.
[Claim 3] Image formation equipment according to claim 1 or 2 with which it saves and surface roughness Rz of a sheet is characterized by said thing [that it is 1/5 or less / of toner particle size].
[Claim 4] Claims 1 and 2 characterized by consisting of said materials with which it saves and a sheet electrifies a toner in predetermined electrification polarity, or image formation equipment given in three.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to image formation equipments, such as a printer which forms an image using electrophotographic technology, facsimile, and a copying machine. It is related with the cleaning equipment using the cleaning blade (only henceforth a blade) which removes the residual toner on the image support which supports the toner image especially.
[0002]
[Description of the Prior Art] Generally the image formation equipment using electrophotographic technology The photo conductor (an example of image support) which has a sensitization layer in a peripheral face, and an electrification means to electrify the peripheral face of this photo conductor uniformly, An exposure means to expose selectively the peripheral face uniformly electrified by this electrification means, and to form an electrostatic latent image, The development means which gives the toner which is a developer to the electrostatic latent image formed by this exposure means, and is used as a visible image (toner image), An imprint means to make transfer media, such as a form, imprint the toner image developed by this development means, and the front face of a photo conductor are contacted, and it has cleaning equipment using the cleaning blade which scratches the toner (residual toner) which remains in the peripheral face of a photo conductor after an imprint, and removes it.
[0003] Moreover, as an imprint means, in order to imprint the toner image on a photo conductor to record media, such as a form, the toner image formed on the photo conductor is imprinted (primary imprint), this is supported, and the thing equipped with the medium imprint object (an example of image support) which imprints this toner image to a record medium further (secondary imprint) is known. The cleaning blade which scratches the toner (residual toner) which remains on that front face also on this medium imprint object, and removes it after a toner image imprint on it is prepared.
[0004]
[Problem(s) to be Solved by the Invention] In recent years, in the image formation equipment using electrophotographic technology, high-definition-izing (diameter[of a granule]-izing of a toner), improvement in the speed, and reinforcement are desired. In order to meet this want, especially the want of high-definition-izing (diameter[of a granule]-izing of a toner), in order to remove the toner which remained on image support after the toner image imprint good, it is necessary to raise cleaning nature, and it possible to increase the contact pressure and/or the contact angle of a cleaning blade over the front face of image support as one policy for it.
[0005] However, if the contact pressure of a cleaning blade to the front face of image support is increased, since the frictional force between a blade and an image support front face will become large, when especially a contact angle is enlarged, the problem that a blade becomes easy to get turned up arises. It especially becomes easy to be generated the time of the residual toner in an image support front face forming few image patterns that he can be this blade earnestly, and under a high-humidity/temperature environment.
[0006] The object of this invention is to offer the image formation equipment which **** of a blade cannot produce easily, even when solving the above problems and increasing the contact pressure and/or the contact angle of a cleaning blade.
[0007]
[Means for Solving the Problem] In order to attain the above-mentioned object image formation equipment according to claim 1 A front face of image support which is the body of revolution which supports a toner image, and this image support is contacted. A cleaning blade which scratches a toner which remains on image support after a toner image on image support is imprinted, Rather than the contact section of image support and a cleaning blade, set caudad and image support is contacted. It is image formation equipment which scoops up a toner scratched by said cleaning blade and which saved and was equipped with a sheet. It saves, and a point of a sheet separates a gap from an image support front face, and is installed, and this installation section is characterized by forming toner **** on which the contact section and its direct lower part of said image support and cleaning blade are made to always deposit said toner scratched by said cleaning blade. It is characterized by preparing said supporter material which saves and supports a sheet towards an image support side [near the contact section with said image support], and being in image formation equipment according to claim 2 in image formation equipment according to claim 1. In image formation equipment according to claim 1 or 2, it saves and image formation equipment according to claim 3 is characterized by said thing [that the surface roughness Rz of a sheet is 1/5 or less / of toner particle size]. In addition, "toner particle size" is the semantics of number mean particle diameter of a toner used with this

image formation equipment. Image formation equipment according to claim 4 is characterized by consisting of said materials with which it saves and a sheet electrifies a toner in predetermined electrification polarity in claims 1 and 2 or image formation equipment given in three.
[0008]
[Function and Effect] The toner which remains on image support after the toner image on the image support which is the body of revolution which supports a toner image according to image formation equipment according to claim 1 is imprinted is taken [it scratches it and] and removed by the cleaning blade in contact with the front face of image support, this scratched toner saves, and it is saved with a sheet. And according to this image formation equipment according to claim 1, the point of the pile sheet described a front separates a gap from an image support front face, and is installed. Since this installation section forms toner **** on which the contact section and its direct lower part of said image support and cleaning blade are made to always deposit the toner scratched by said cleaning blade According to the operation as lubricant of the toner deposited on said contact section and its direct lower part, it is hard to produce **** of a blade and it becomes so that it may explain below. That is, since the toner scratched with the blade has always accumulated on the contact section and its direct lower part of image support and a cleaning blade, a toner will always be supplied to the contact section of the rotating image support and a cleaning blade, without being influenced by the image pattern. Since a toner has the operation as lubricant, even when the frictional force between a blade and an image support front face declines and the contact pressure and/or the contact angle of a blade are increased as a result by existence of this toner, it is hard coming to generate **** of a blade. Moreover, it is hard coming to generate blade **** under a high-humidity/temperature environment for the same reason. As mentioned above, according to this image formation equipment according to claim 1, even when increasing the contact pressure and/or the contact angle of a cleaning blade, it is hard coming to generate **** of a blade. moreover, a cleaning blade -- being the so-called -- a stick slip -- according to this image formation equipment according to claim 1, although behavior has removed the toner, when the frictional force between a blade and an image support front face declines, the above-mentioned behavior will be stabilized and the cleaning engine performance will improve further as a result.
[0009] And since toner **** on which the contact section and its direct lower part of image support and a cleaning blade are made to always deposit the toner scratched by the cleaning blade is formed in the installation section which saved, separated the image support front face and the gap and installed the point of a sheet, the still more nearly following operation effects are acquired. That is, since it saves and the sheet touches image support, it fine-vibrates according to the revolution of image support. although it will circulate through the toner deposited in the operation of said toner **** according to the hand of cut of image support, the toner of the diameter of a granule supplies it to the contact section of image support and a blade comparatively according to an operation of the above-mentioned fine oscillation in this case -- having -- being easy -- the frictional force between a blade and an image support front face falls to fitness further with the toner of this diameter of a granule -- things -- ** Therefore, the blade mentioned above will get turned up and improvement in depressant action and the cleaning engine performance will be further obtained by fitness. Moreover, since it is formed in the installation section in which it saved into, and toner **** separated the image support front face and the gap, and installed the point of a sheet, circulation of the toner mentioned above will be made efficiently. Therefore, since supply in said contact section of the toner of the diameter of a granule will also be made comparatively efficiently, the frictional force between a blade and an image support front face declines much more certainly, the blade mentioned above will get turned up and improvement in depressant action and the cleaning engine performance will be obtained much more certainly. Furthermore, toner **** saves, as a result currently formed in the installation section which separated the image support front face and the gap and installed the point of a sheet, it will save, the gap of an image support front face and said installation section will be small [near the contact section of a sheet and image support], and a toner will accumulate promptly in the activity early stages of the part and image formation equipment.
[0010] In addition, as conventional cleaning equipment, as shown in drawing 5 (a) or (b) A toner is made to deposit on the space S of the contact section C of the image support 1 and the cleaning blade 3 which are rotated in the direction of arrow head A in which the contact section C and a gap were separated and prepared caudad. With this deposited toner Although what was going to remove the various foreign matters which deposited from paper is known (JP,1-161288,A), with this conventional cleaning equipment A toner accumulates on the space S in which the contact section C and a gap were separated and prepared under the contact section C of the image support 1 and a cleaning blade 3. Since a toner does not necessarily accumulate on the contact section and its direct lower part of image support and a cleaning blade like invention of the claim 1 above-mentioned publication, and it does not save and toner **** is not necessarily formed in the installation section of a sheet 4 The above-mentioned operation effect by invention according to claim 1 is not acquired.
[0011] Since according to image formation equipment according to claim 2 said supporter material which saves and supports a sheet towards an image support side [near the contact section with said image support] is prepared and is in image formation equipment according to claim 1, in spite of forming toner **** in said installation section, it will save and the leakage of the toner in the contact section of a sheet and image support will be prevented certainly. According to image formation equipment according to claim 3, in image formation equipment according to claim 1 or 2, said circulation effectiveness of the toner which saved, and it becomes easy to move a toner and deposited the front face of a sheet since it saved and the surface roughness Rz of a sheet had become 1/5 or less [of toner particle size] improves further. Therefore, the frictional force between a blade and an image support front face declines much more certainly, the blade mentioned above will get turned up and improvement in depressant

action and the cleaning engine performance will be obtained much more certainly. According to image formation equipment according to claim 4, in claims 1 and 2 or image formation equipment given in three, since it consists of said materials with which it saves and a sheet electrifies a toner in predetermined electrification polarity, the still more nearly following operation effects are acquired. Namely, the toner (residual toner) which remains on image support after the toner image on image support is imprinted is in the condition that that from which what was charged in a certain polarity, and it became reversed polarity was intermingled. Therefore, when this is left, there is a possibility that the circulation effectiveness of the toner deposited by the adsorption power of toners as mentioned above may fall. On the other hand, since it consists of said materials with which it saves and a sheet electrifies a toner in predetermined electrification polarity according to this image formation equipment according to claim 4 The deposited toner will be arranged with like-pole nature by saving, after depositing, contacting a sheet or ****ing, in case the residual toner adhering to an image support front face saves and between sheets is passed through. Therefore, the circulation effectiveness of the deposited toner will improve further, the frictional force between a blade and an image support front face declines much more certainly, the blade mentioned above will get turned up and improvement in depressant action and the cleaning engine performance will be obtained much more certainly.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing.

The outline positive cross section and drawing 2 which show the gestalt of operation of the 1st of the image formation equipment which <gestalt of the 1st operation> drawing 1 requires for this invention are the enlarged view of the important section.

[0013] This image formation equipment is equipment which can form a full color image using yellow (Y), cyanogen (C), a Magenta (M), and the development counter by the toner of four colors of black (K).

[0014] In drawing 1 , 10 is a photo conductor as image support, and revolution actuation is carried out in the direction of a graphic display arrow head by the proper driving means which is not illustrated. Around the photo conductor 10, the electrification roller 12 as an electrification means, the developing roller 13 (Y, C, M, K) as a development means, medium imprint equipment 30, and cleaning equipment 20 are arranged along the hand of cut.

[0015] The electrification roller 12 electrifies a peripheral face uniformly in contact with the peripheral face of a photo conductor 10. The alternative exposure L according to desired image information is made with the exposure unit which is not illustrated in the peripheral face of the photo conductor 10 charged uniformly, and an electrostatic latent image is formed on a photo conductor 10 of this exposure L. With a developing roller 13, a toner is given and this electrostatic latent image is developed. With the gestalt of this operation, developing-roller 13K for developing-roller 13M and blacks developing-roller 13Y for yellow, developing-roller 13C for cyanogen, and for Magentas are prepared as a developing roller. When it may have comes to contact a photo conductor 10 selectively and contacts, these developing rollers 13Y, 13C, 13M, and 13K give the toner of the yellow, cyanogen, a Magenta, or the blacks to the front face of a photo conductor 10, and develop the electrostatic latent image on a photo conductor 10. The developed toner image is imprinted on the medium imprint belt 36 as a medium imprint object mentioned later (primary imprint section Tr1 reference).

[0016] The blade 21 for photo conductors which scratches the toner (residual toner) which cleaning equipment 20 remained to the peripheral face of a photo conductor 10 after the above-mentioned imprint, and has adhered (cleaning blade), With this blade 21, it is scratched and taken, and the falling toner (T) is scooped up and scooped up. A sheet 22, It has the deposition section 23 on which the falling toner is made to deposit, the receptacle section 24 which receives the toner for which this deposition section 23 was overflowed, the screw 25 conveyed in the waste toner bottle which does not illustrate the toner in this receptacle section 24, and the case 26.

[0017] As for the blade 21, the upper part is being fixed to the blade holder 27. As for the blade holder 27, the ends (ends in the direction which intersects perpendicularly with space) are attached rockable to the flanks 26a and 26a (only one side is illustrated) of a case 26 with Shafts 27a and 27a (only one side is illustrated). Between the case 26 and the blade holder 27, the blade energization spring (compression spring) 28 is formed, and point (edge) 21a of a blade 21 contacts the front face of a photo conductor 10 according to the energization force of this blade energization spring 28, and the elastic force of blade 21 self. It saves, and a sheet 22 sets caudad from the contact section C of a blade 21 and a photo conductor 10, contacts a photo conductor 10, and scoops up the toner scratched with the blade 21.

[0018] It saves, and that point 22c separates a gap from photo conductor 10 front face, and is installed, and the sheet 22 forms toner **** (22b) on which this installation section 22b makes the contact section C and its direct lower part U of a photo conductor 10 and a cleaning blade 21 always deposit the toner T scratched by said cleaning blade 21 so that it may show clearly in drawing 2 . That is, the front face of a photo conductor 10 and said toner T which saves, is formed by installation section 22b of a sheet 22, and was scratched by the contact section C and its direct lower part U of a photo conductor 10 and a cleaning blade 21 with the blade 21 by this deposition section 23 always deposit the deposition section 23 in the gestalt of this operation. It saves, and the sheet 22 is extended in the direction which intersects perpendicularly with space, and the deposition section 23 is continued and formed in the lower part overall length of said contact section C. It saves, the gap of 23d is formed between point (upper bed section) 22c of a sheet 22, and a blade 21, and an excessive toner overflows to said receptacle section 24 among the toners T deposited on said deposition section 23 through this gap of 23d. It saves, and the lower 22a has fixed to clamp-face 26b of a case 26 by the glue line (for example, adhesives) 29, and the sheet 22 touches the photo

conductor 10 by the elastic force of itself. A sign C1 shows the contact section. It saves, and between that point 22c and said lower 22a, the sheet 22 touches the photo conductor 10 and forms said toner **** 22b in the upper part [section / C1 / this / contact]. if it has another way of speaking, it can set in the gestalt of this operation — it saved and, generally the sheet 22 was known conventionally — it will save, and will consist of sheets for a long time (related with the hand of cut of the image support 10 for a long time), and said toner **** 22b will be constituted from this portion (installation section) formed for a long time. That is, plate-like [which was generally known conventionally / which saved and was formed for a long time than a sheet / thin] can save, and the above-mentioned toner **** 22b can be formed by setting a sheet 22 caudad rather than the point 22c, and contacting it to a photo conductor 10. Therefore, toner **** 22b is formed so that the gap on the front face of a photo conductor may become large gradually toward the upper part.

[0019] this — by saving, since the sheet 22 touches the photo conductor 10, it fine-vibrates according to a revolution of a photo conductor 10. Although it will circulate clockwise according to the hand of cut (it sets to drawing 2 and is a counterclockwise rotation) of a photo conductor 10 as an arrow head a shows the toner T deposited in the operation of said toner **** 22b to drawing 2 , the toner of the diameter of a granule becomes comparatively according to an operation of the above-mentioned fine oscillation that the contact section C of a photo conductor 10 and a blade 21 is easy to be supplied in this case. When it explains in detail, as an arrow head a1 shows the toner of the surplus which is held in the deposition section 23 and stopped going out in the process through which the deposited toner T circulates, it will overflow to said receptacle section 24, but a photo conductor 10 and when it saves and the sheet 22 is fine-vibrating, in the upper part of the deposition section 23, the toner of the diameter of a large drop meeting-comes to be easy comparatively. Therefore, most toners which receive as the arrow head a1 showed, and are overflowed to the section 24 turn into a toner of the diameter of a large drop (the toner of the diameter of a large drop overflowing preferentially), and the toner of the diameter of a granule will remain in the deposition section 23 comparatively as a result. For this reason, the toner of the diameter of a granule becomes comparatively that the contact section C of a photo conductor 10 and a blade 21 is easy to be supplied. In addition, even if foreign matters, such as paper powder, mix in Toner T, since a foreign matter will overflow preferentially, it is hard coming to also generate the situation where a foreign matter will be supplied to said contact section C, according to an operation of the above-mentioned fine oscillation.

[0020] moreover, it can set in the gestalt of this operation — it saves, and the surface roughness Rz of a sheet 22 is constituted so that it may become 1/5 or less [of toner particle size]. Furthermore, it saves, and the frictional electrification sequence of a sheet 22 has chosen the material so that it may become the direction which electrifies a toner in predetermined electrification polarity. That is, it saves and the sheet 22 consists of materials which electrify a toner in predetermined electrification polarity. In addition, the case 26 consists of hard material, for example, hard synthetic resin.

[0021] The above cleaning equipments are constituted by the case 26 as a unit, and are attached in the frame which the main part of image formation equipment does not illustrate removable.

[0022] Medium imprint equipment 30 has endless-like the medium imprint belt 36, the secondary imprint roller 37, and the cleaning means 38 as a medium imprint object laid by a driving roller 31, four follower rollers 32, 33, 34, and 35, and each [these] roller.

[0023] the gearing with which the driving roller 31 was fixed to the edge and which does not illustrate meshes with the gearing for actuation of a photo conductor 10 (not shown) — a photo conductor 10 and abbreviation — revolution actuation is carried out with the same peripheral speed — having — therefore, the medium imprint belt 36 — a photo conductor 10 and abbreviation — circulation actuation is carried out in the direction of a graphic display arrow head with the same peripheral speed. The follower roller 35 is a primary imprint roller, and the pressure welding of it is carried out to the photo conductor 10 through the medium imprint belt 36, and it forms the primary imprint section Tr1 between a photo conductor 10 and the medium imprint belt 36 in this pressure-welding section. The electrode roller which is not illustrated through the medium imprint belt 36 in a driving roller 31 is arranged, and primary imprint voltage is impressed to the medium imprint belt 36 through the electrode roller. The follower roller 32 is a tension roller and is energizing the medium imprint belt 36 in the flare direction with the energization means which is not illustrated. The follower roller 33 is a backup roller which forms the secondary imprint section Tr2. Opposite arrangement of the secondary imprint roller 37 is carried out through the medium imprint belt 36 at this backup roller 33. The secondary imprint roller 37 can attach and detach to the medium imprint belt 36 according to the attachment-and-detachment device which is not illustrated. Secondary imprint voltage is impressed to the secondary imprint roller 37. The follower roller 34 is a backup roller for the cleaning means 38. the medium imprint which scratches the toner (secondary imprint residual toner) which the cleaning means 38 contacted the medium imprint belt 36, and has remained and adhered to the peripheral face — the body and its function — it consists of blades. this medium imprint — the body and its function — a blade can attach and detach to the medium imprint belt 36 according to the attachment-and-detachment device which is not illustrated. in addition, a medium imprint — the body and its function — the toner which failed to be scratched by the blade 38 is not illustrated — popularity is won and it is conveyed by the section with a carrier eclipse and the screw which is not illustrated to a waste toner bottle.

[0024] The toner image with which the toner image on a photo conductor 10 was imprinted on the medium imprint belt 36, and was imprinted on the medium imprint belt 36 in the primary imprint section Tr1 in the process in which circulation actuation of the medium imprint belt 36 is carried out is imprinted by the record media P, such as a form which is the object for an imprint supplied between the secondary imprint rollers 37, in the secondary imprint

section Tr2. It is fed with a record medium P from the feed equipment which is not illustrated, and it is supplied to the secondary imprint section Tr2 to predetermined timing.
[0025] The actuation of the above whole image formation equipment is as follows.
(i) If the printing command signal (image formation signal) from the host computer (personal computer etc.) which is not illustrated is inputted into the control section of image formation equipment, the medium imprint belt 36 will be in a firm-bridging condition by actuation of a tension roller 32, and revolution actuation of a photo conductor 10, a developing roller 13, and the medium imprint belt 36 will be carried out by the driving means which is not illustrated.
(ii) The peripheral face of a photo conductor 10 is uniformly charged with the electrification roller 12.
(iii) With the exposure unit which is not illustrated, the alternative exposure L according to the image information of the 1st amorous glance (for example, Magenta (M)) is made by the peripheral face of the photo conductor 10 charged uniformly, and the electrostatic latent image for Magentas is formed in it.
(iv) Only developing-roller 13M for the 1st amorous glance (for example, Magenta) contacts a photo conductor 10, the above-mentioned electrostatic latent image is developed by this, and the toner image of the 1st amorous glance (for example, Magenta) is formed on a photo conductor 10 of it.
(v) The primary imprint voltage of the electrification polarity and reversed polarity of the above-mentioned toner is impressed to the medium imprint belt 36, and the toner image formed on the photo conductor 10 is imprinted on the medium imprint belt 36 in the primary imprint section Tr1 Tr1, i.e., the pressure-welding section of a photo conductor 10 and the medium imprint belt 36. At this time, the secondary imprint roller 37 and the cleaning means 38 are estranged from the medium imprint belt 36.
(vi) After the toner (primary residual toner) which remains on a photo conductor 10 is removed by the blade 21 for photo conductors, a photo conductor 10 is discharged by the electric discharge light from the electric discharge means which is not illustrated.
(vii) Actuation of above-mentioned (ii) - (vi) is repeated if needed. That is, according to the content of the above-mentioned printing command signal, it is repeated with the 2nd amorous glance, the 3rd amorous glance, and the 4th amorous glance, and the toner image according to the content of the above-mentioned printing command signal piles up on the medium imprint belt 36, and is formed on the medium imprint belt 36.
(viii) Just before a record medium P is supplied to predetermined timing and the head of a record medium P reaches the secondary imprint section Tr2, or after reaching (in the location of the request on a record medium P in short) While the secondary imprint roller 37 is pressed by the medium imprint belt 36 to the timing by which the toner image on the medium imprint belt 36 is imprinted, secondary imprint voltage is impressed, and the toner image on the medium imprint belt 36 (fundamentally full color image) is imprinted on a record medium P. moreover, a medium imprint — the body and its function — a blade 38 contacts the medium imprint belt 36, and the toner (secondary residual toner) which remains on the medium imprint belt 36 after a secondary imprint is removed.
(ix) By passing the anchorage device which a record medium P does not illustrate, a toner image is established on a record medium P, and a record medium P is discharged out of equipment after that.
(x) If the predetermined time input of the above-mentioned image formation signal is not carried out or equipment is turned off after actuation of the above (i) - (ix) gets used, the firm-bridging condition of the medium imprint belt 36 will be canceled by actuation of a tension roller.
[0026] According to the above image formation equipments, the following operation effects are acquired.
(a) The toner which remains on the image support 10 after the toner image on the image support 10 which is the body of revolution which supports a toner image is imprinted is taken [it scratches it and] and removed by the cleaning blade 21 in contact with the front face of the image support 10, this scratched toner saves, and it is saved with a sheet 22. And according to this image formation equipment, save, and point 22c of a sheet 22 separates a gap from image support 10 front face, and is installed. Since this installation section 22b forms toner **** (22b) on which the contact section C and its direct lower part U of the image support 10 and a cleaning blade 21 are made to always deposit the toner scratched by the cleaning blade 21 According to the operation as lubricant of the toner T deposited on said contact section C and its direct lower part U, it is hard to produce **** of a blade 21, and it becomes so that it may explain below. That is, since the toner scratched with the blade 21 has always accumulated on the contact section C and its direct lower part U of the image support 10 and a cleaning blade 21, a toner will always be supplied to the contact section C of the rotating image support 10 and a cleaning blade 21, without being influenced by the image pattern. Since a toner has the operation as lubricant, even when the frictional force between a blade 21 and image support 10 front face declines and the contact pressure and/or the contact angle of a blade 21 are increased as a result by existence of this toner, it is hard coming to generate **** of a blade 21. Moreover, it is hard coming to generate blade **** under a high-humidity/temperature environment for the same reason. As mentioned above, according to the image formation equipment of the gestalt of this operation, even when increasing the contact pressure and/or the contact angle of a cleaning blade 21, it is hard coming to generate **** of a blade 21. moreover, the cleaning blade 21 — being the so-called — a stick slip — according to this image formation equipment, although behavior has removed the toner, when the frictional force between a blade 21 and image support 10 front face declines, the above-mentioned behavior will be stabilized and the cleaning engine performance will improve further as a result.
[0027] And since toner **** 22b on which the contact section C and its direct lower part U of the image support 10 and a cleaning blade 21 are made to always deposit the toner scratched by the cleaning blade 21 is formed by the installation section 22b which saved, separated image support 10 front face and the gap, and installed point 22c of a sheet 22, the still more nearly following operation effects are acquired. That is, since it saves and the sheet 22

touches the image support 10, it fine-vibrates according to the revolution of the image support 10. although it will circulate through the toner deposited in the operation of toner **** 22b according to the hand of cut of the image support 10, the toner of the diameter of a granule supplies it to the contact section C of the image support 10 and a blade 21 comparatively according to an operation of the above-mentioned fine oscillation in this case — having — being easy — the frictional force between a blade 21 and image support 10 front face falls to fitness further with the toner of this diameter of a granule — things — ** Therefore, the blade mentioned above will get turned up and improvement in depressant action and the cleaning engine performance will be further obtained by fitness. Moreover, since it is formed by the installation section 22b in which it saved into, and toner **** 22b separated image support 10 front face and the gap, and installed point 22c of a sheet 22, circulation of the toner mentioned above will be made efficiently. Therefore, since supply in said contact section C of the toner of the diameter of a granule will also be made comparatively efficiently, the frictional force between a blade 21 and image support 10 front face declines much more certainly, the blade 21 mentioned above will get turned up, and improvement in depressant action and the cleaning engine performance will be obtained much more certainly. furthermore, as a result currently formed by the installation section 22b in which it saved into, and toner **** 22b separated the image support front face and the gap, and installed point 22c of a sheet It saves and the gap of image support 10 front face and said installation section 22b is small in the about one contact section C of a sheet 22 and the image support 10. In the activity early stages of the part and image formation equipment (for example, when it is provided for a user and an activity is started), a toner will accumulate promptly.

[0028] In addition, in the activity early stages of image formation equipment, although it is a short time by the time a toner accumulates, some time amount will be taken, but since lubricant, such as polyvinylidene fluoride, is usually applied on the surface of the blade in this seed image formation equipment in order to prevent blade **** in the early stages of an activity, blade **** does not necessarily arise in the activity first stage until a toner accumulates.

[0029] (b) Since toner **** 22b saves and is formed in the installation section of a sheet 22, save and it becomes unnecessary to prepare the member for toner deposition special in addition to sheet 22. Therefore, components mark are reduced and it is reduced also like an assembler.

(c) Since it saves and the surface roughness Rz of a sheet 22 has become 1/5 or less [of toner particle size], save and the circulation effectiveness of the toner which it becomes easy to move a toner and deposited the front face of a sheet 22 improves further. Therefore, the frictional force between a blade 21 and image support 10 front face declines much more certainly, the blade 21 mentioned above will get turned up, and improvement in depressant action and the cleaning engine performance will be obtained much more certainly.

(d) Since it consists of materials with which it saves and a sheet 22 electrifies a toner in predetermined electrification polarity, the still more nearly following operation effects are acquired. Namely, the toner (residual toner) which remains on the image support 10 after the toner image on the image support 10 is imprinted is in the condition that that from which what was charged in a certain polarity, and it became reversed polarity was intermingled. Therefore, when this is left, there is a possibility that the circulation effectiveness of the toner deposited by the adsorption power of toners as mentioned above may fall. On the other hand, since it consists of materials with which it saves and a sheet 22 electrifies a toner in predetermined electrification polarity according to the image formation equipment of the gestalt of this operation The deposited toner will be arranged with like-pole nature by saving, after depositing, contacting a sheet 22 or ****ing, in case the residual toner adhering to image support 10 front face saves and between sheets 22 (said contact portion C1) is passed through. Therefore, the circulation effectiveness of the deposited toner T will improve further, the frictional force between a blade 21 and image support 10 front face declines much more certainly, the blade mentioned above will get turned up and improvement in depressant action and the cleaning engine performance will be obtained much more certainly.

(e) Since it has a cleaning means 38 to remove the medium imprint object 36 and its secondary residual toner according to the image formation equipment of the gestalt of this operation, the following operation effects are acquired. Supposing it makes the toner image formed on the photo conductor 10 the configuration which the record media P, such as a form, are made to imprint directly, without establishing the medium imprint object 36, foreign matters, such as paper powder which adhered to photo conductor 10 front face from the form etc. in the imprint section (Tr1 reference), will be scratched by the blade 21 with a residual toner. Therefore, supposing the toner scratched with the blade 21 makes it the configuration always deposited on the contact section C and its direct lower part U of a photo conductor 10 and a blade 21, foreign matters, such as paper powder, will also be deposited with a toner, and there is a possibility that photo conductor 10 front face or a blade 21 may be deleted with this paper powder etc. On the other hand, since it has a cleaning means 38 to remove the medium imprint object 36 and its secondary residual toner according to the image formation equipment of the gestalt of this operation, the paper powder which adhered to the medium imprint object 36 from the form etc. in the secondary imprint section Tr2 will be removed by the cleaning means 38 with a secondary residual toner. In the image formation equipment of the gestalt of this operation, namely, contacting in the primary imprint section Tr1 to a photo conductor 10 Since it is the medium imprint object 36 in the condition of paper powder etc. having been removed and having become beautiful, In spite of being the configuration which the toner (primary residual toner) scratched with the blade 21 always deposits on the contact section C and its direct lower part U of a photo conductor 10 and a blade 21 The situation where foreign matters, such as paper powder, will accumulate with a primary residual toner stops arising (the amount will become very little even if a foreign matter accumulates). And as mentioned above, even if foreign matters, such as paper powder, mix in the toner T to deposit, since a foreign matter will overflow preferentially, it is

very hard coming to generate the situation where a foreign matter will be supplied to said contact section C, according to an operation of the above-mentioned fine oscillation. Therefore, in spite of being the configuration which the toner (primary residual toner) T scratched with the blade 21 always deposits on the contact section C and its direct lower part U of a photo conductor 10 and a blade 21, a possibility of saying that photo conductor 10 front face or a blade 21 will be deleted with paper powder etc. disappears.

[0030] <Gestalt of the 2nd operation> drawing 3 is the enlarged view in the gestalt of operation of the 2nd of the image formation equipment concerning this invention in which saving into and showing sheet 22 portion. In this drawing, the same sign is given to the same portion as a gestalt thru/or the corresponding portion of implementation of the above 1st.

[0031] The point that the gestalt of this operation differs from the gestalt of implementation of the above 1st is saved, carries out crookedness formation of the sheet 22 beforehand at the character type of "**", and is in the point of having made it make the image support 10 contacting by 22d of that flection, and there is no change in other points. Also according to the gestalt of this operation, the operation effect by the gestalt of implementation of the above 1st and the same operation effect are acquired.

[0032] <Gestalt of the 3rd operation> drawing 4 (a) is the enlarged view in the gestalt of operation of the 3rd of the image formation equipment concerning this invention in which saving into and showing a sheet 22 and its supporter material 40. In this drawing, the same sign is given to the same portion as a gestalt thru/or the corresponding portion of implementation of the above 1st.

[0033] The point that the gestalt of this operation differs from the gestalt of implementation of the above 1st is in the point in which the supporter material 40 which saves and supports a sheet 22 towards the image support 10 side in the about one contact section C with the image support 10 is formed, and is, and there is no change in other points. The supporter material 40 is a plate which saves in the direction which intersects perpendicularly with space, and has the same length as a sheet 22, it was saved, has fixed by glue line 29a to lower 22a of a sheet 22, and has fixed to clamp-face 26b of a case 26 by glue line 29b with this another supporter material 40. Up 40a of the supporter material 40 is prolonged to the about one contact section C with the image support 10, was saved and has backed up the sheet 22. Also according to the gestalt of this operation, the operation effect by the gestalt of the 1st operation and the same operation effect are acquired. Furthermore, since it saves and the sheet 22 is supported by the supporter material 40 towards the image support 10 side in the about one contact section C with the image support 10, the following operation effects are acquired. If it is the configuration which a toner deposits on toner **** (installation section) 22b which saved and installed the sheet 22, the inclination to save and for the contact force of a sheet 22 and the image support 10 to become weak with the weight of the toner will arise. On the other hand, since it saves and the sheet 22 is supported by the supporter material 40 towards the image support 10 side with the gestalt of this operation in the about one contact section C with the image support 10 In spite of forming toner **** by said installation section 22b, it will save, the contact force in the contact section C1 of a sheet 22 and the image support 10 will be secured, and the leakage of a toner will be prevented certainly. moreover — since it saved and the supporter material 40 has fixed on the sheet 22 — saving — a sheet 22 — also getting twisted — it will be controlled.

[0034] <Gestalt of the 4th operation> drawing 4 (b) is the enlarged view in the gestalt of operation of the 4th of the image formation equipment concerning this invention in which saving into and showing a sheet 22 and its supporter material 41. In this drawing, the same sign is given to the same portion as a gestalt thru/or the corresponding portion of implementation of the above 1st.

[0035] The point that the gestalt of this operation differs from the gestalt of implementation of the above 1st is in the point in which different supporter material 41 from the gestalt of implementation of the above 3rd which saves and supports a sheet 22 towards the image support 10 side in the about one contact section C with the image support 10 is formed, and is, and there is no change in other points. The supporter material 41 of the gestalt of this operation is the plate of the abbreviation mold for L characters which saves in the direction which intersects perpendicularly with space, and has the same length as a sheet 22, and that lower 41a fixes in a case 26 by glue line 29c, and that up 41b saves and is supporting the sheet 22 in the upper part somewhat rather than contact section C1 portion with the image support 10. It saves with up 41b of the supporter material 41, and the contact section with a sheet 22 may fix with adhesives etc., and does not need to fix. Also according to the gestalt of this operation, the operation effect by the gestalt of implementation of the above 3rd and the same operation effect are acquired.

[0036] As mentioned above, although the gestalt of operation of this invention was explained, this invention is not limited to the gestalt of the above-mentioned operation, and deformation implementation is possible for it suitably within the limits of the summary of this invention. For example, although the gestalt of the above-mentioned implementation explained the case where image support was a photo conductor, this invention can be applied also when image support is a medium imprint object. Moreover, although the gestalt of the above-mentioned implementation explained the case where image support (photo conductor) was cylindrical, this invention can be applied also when image support is a belt-like.

[0037]

[Effect of the Invention] Even when increasing the contact pressure and/or the contact angle of a cleaning blade, it is hard coming to generate **** of a blade with any image formation equipment according to claim 1 to 4. moreover, a cleaning blade — being the so-called — a stick slip — behavior will be stabilized and the cleaning engine performance will improve further as a result. And the toner of the diameter of a granule becomes comparatively that the contact section of image support and a blade is easy to be supplied, a blade will get turned up, and improvement

in depressant action and the cleaning engine performance will be further obtained by fitness. Furthermore, in the activity early stages of image formation equipment, a toner will accumulate promptly. Furthermore, according to image formation equipment according to claim 2, it will save and the leakage of the toner in the contact section of a sheet and image support will be prevented certainly. According to image formation equipment according to claim 3, a blade will get turned up and improvement in depressant action and the cleaning engine performance will be obtained much more certainly. According to image formation equipment according to claim 4, a blade will get turned up and improvement in depressant action and the cleaning engine performance will be obtained much more certainly.
[0038]

[Translation done.]

* NOTICES *

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TECHNICAL FIELD

[The technical field to which invention belongs] This invention relates to image formation equipments, such as a printer which forms an image using electrophotographic technology, facsimile, and a copying machine. It is related with the cleaning equipment using the cleaning blade (only henceforth a blade) which removes the residual toner on the image support which supports the toner image especially.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] Image formation equipment generally using electrophotographic technology, The photo conductor (an example of image support) which has a sensitization layer in a peripheral face, and an electrification means to electrify the peripheral face of this photo conductor uniformly, An exposure means to expose selectively the peripheral face uniformly electrified by this electrification means, and to form an electrostatic latent image, The development means which gives the toner which is a developer to the electrostatic latent image formed by this exposure means, and is used as a visible image (toner image), An imprint means to make transfer media, such as a form, imprint the toner image developed by this development means, and the front face of a photo conductor are contacted, and it has cleaning equipment using the cleaning blade which scratches the toner (residual toner) which remains in the peripheral face of a photo conductor after an imprint, and removes it.
[0003] Moreover, as an imprint means, in order to imprint the toner image on a photo conductor to record media, such as a form, the toner image formed on the photo conductor is imprinted (primary imprint), this is supported, and the thing equipped with the medium imprint object (an example of image support) which imprints this toner image to a record medium further (secondary imprint) is known. The cleaning blade which scratches the toner (residual toner) which remains on that front face also on this medium imprint object, and removes it after a toner image imprint on it is prepared.

[Translation done.]

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EFFECT OF THE INVENTION

[Function and Effect] The toner which remains on image support after the toner image on the image support which is the body of revolution which supports a toner image according to image formation equipment according to claim 1 is imprinted is taken [it scratches it and] and removed by the cleaning blade in contact with the front face of image support, this scratched toner saves, and it is saved with a sheet. And according to this image formation equipment according to claim 1, the point of the pile sheet described a front separates a gap from an image support front face, and is installed. Since this installation section forms toner **** on which the contact section and its direct lower part of said image support and cleaning blade are made to always deposit the toner scratched by said cleaning blade According to the operation as lubricant of the toner deposited on said contact section and its direct lower part, it is hard to produce **** of a blade and it becomes so that it may explain below. That is, since the toner scratched with the blade has always accumulated on the contact section and its direct lower part of image support and a cleaning blade, a toner will always be supplied to the contact section of the rotating image support and a cleaning blade, without being influenced by the image pattern. Since a toner has the operation as lubricant, even when the frictional force between a blade and an image support front face declines and the contact pressure and/or the contact angle of a blade are increased as a result by existence of this toner, it is hard coming to generate **** of a blade. Moreover, it is hard coming to generate blade **** under a high-humidity/temperature environment for the same reason. As mentioned above, according to this image formation equipment according to claim 1, even when increasing the contact pressure and/or the contact angle of a cleaning blade, it is hard coming to generate **** of a blade. moreover, a cleaning blade — being the so-called — a stick slip — according to this image formation equipment according to claim 1, although behavior has removed the toner, when the frictional force between a blade and an image support front face declines, the above-mentioned behavior will be stabilized and the cleaning engine performance will improve further as a result.
[0009] And since toner **** on which the contact section and its direct lower part of image support and a cleaning blade are made to always deposit the toner scratched by the cleaning blade is formed in the installation section which saved, separated the image support front face and the gap and installed the point of a sheet, the still more nearly following operation effects are acquired. That is, since it saves and the sheet touches image support, it fine-vibrates according to the revolution of image support. although it will circulate through the toner deposited in the operation of said toner **** according to the hand of cut of image support, the toner of the diameter of a granule supplies it to the contact section of image support and a blade comparatively according to an operation of the above-mentioned fine oscillation in this case — having — being easy — the frictional force between a blade and an image support front face falls to fitness further with the toner of this diameter of a granule — things — ** Therefore, the blade mentioned above will get turned up and improvement in depressant action and the cleaning engine performance will be further obtained by fitness. Moreover, since it is formed in the installation section in which it saved into, and toner **** separated the image support front face and the gap, and installed the point of a sheet, circulation of the toner mentioned above will be made efficiently. Therefore, since supply in said contact section of the toner of the diameter of a granule will also be made comparatively efficiently, the frictional force between a blade and an image support front face declines much more certainly, the blade mentioned above will get turned up and improvement in depressant action and the cleaning engine performance will be obtained much more certainly. Furthermore, toner **** saves, as a result currently formed in the installation section which separated the image support front face and the gap and installed the point of a sheet, it will save, the gap of an image support front face and said installation section will be small [near the contact section of a sheet and image support], and a toner will accumulate promptly in the activity early stages of the part and image formation equipment.
[0010] In addition, as conventional cleaning equipment, as shown in drawing 5 (a) or (b) A toner is made to deposit on the space S of the contact section C of the image support 1 and the cleaning blade 3 which are rotated in the direction of arrow head A in which the contact section C and a gap were separated and prepared caudad. With this deposited toner Although what was going to remove the various foreign matters which deposited from paper is known (JP,1-161288,A), with this conventional cleaning equipment A toner accumulates on the space S in which the contact section C and a gap were separated and prepared under the contact section C of the image support 1 and a cleaning blade 3. Since a toner does not necessarily accumulate on the contact section and its direct lower part of image support and a cleaning blade like invention of the claim 1 above-mentioned publication, and it does not save and toner **** is not necessarily formed in the installation section of a sheet 4 The above-mentioned operation effect by invention according to claim 1 is not acquired.
[0011] Since according to image formation equipment according to claim 2 said supporter material which saves and

supports a sheet towards an image support side [near the contact section with said image support] is prepared and is in image formation equipment according to claim 1, in spite of forming toner **** in said installation section, it will save and the leakage of the toner in the contact section of a sheet and image support will be prevented certainly. According to image formation equipment according to claim 3, in image formation equipment according to claim 1 or 2, said circulation effectiveness of the toner which saved, and it becomes easy to move a toner and deposited the front face of a sheet since it saved and the surface roughness Rz of a sheet had become 1/5 or less [of toner particle size] improves further. Therefore, the frictional force between a blade and an image support front face declines much more certainly, the blade mentioned above will get turned up and improvement in depressant action and the cleaning engine performance will be obtained much more certainly. According to image formation equipment according to claim 4, in claims 1 and 2 or image formation equipment given in three, since it consists of said materials with which it saves and a sheet electrifies a toner in predetermined electrification polarity, the still more nearly following operation effects are acquired. Namely, the toner (residual toner) which remains on image support after the toner image on image support is imprinted is in the condition that that from which what was charged in a certain polarity, and it became reversed polarity was intermingled. Therefore, when this is left, there is a possibility that the circulation effectiveness of the toner deposited by the adsorption power of toners as mentioned above may fall. On the other hand, since it consists of said materials with which it saves and a sheet electrifies a toner in predetermined electrification polarity according to this image formation equipment according to claim 4 The deposited toner will be arranged with like-pole nature by saving, after depositing, contacting a sheet or ****ing, in case the residual toner adhering to an image support front face saves and between sheets is passed through. Therefore, the circulation effectiveness of the deposited toner will improve further, the frictional force between a blade and an image support front face declines much more certainly, the blade mentioned above will get turned up and improvement in depressant action and the cleaning engine performance will be obtained much more certainly.

[0012]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing.

The outline positive cross section and drawing 2 which show the gestalt of operation of the 1st of the image formation equipment which <gestalt of the 1st operation> drawing 1 requires for this invention are the enlarged view of the important section.

[0013] This image formation equipment is equipment which can form a full color image using yellow (Y), cyanogen (C), a Magenta (M), and the development counter by the toner of four colors of black (K).

[0014] In drawing 1 , 10 is a photo conductor as image support, and revolution actuation is carried out in the direction of a graphic display arrow head by the proper driving means which is not illustrated. Around the photo conductor 10, the electrification roller 12 as an electrification means, the developing roller 13 (Y, C, M, K) as a development means, medium imprint equipment 30, and cleaning equipment 20 are arranged along the hand of cut.

[0015] The electrification roller 12 electrifies a peripheral face uniformly in contact with the peripheral face of a photo conductor 10. The alternative exposure L according to desired image information is made with the exposure unit which is not illustrated in the peripheral face of the photo conductor 10 charged uniformly, and an electrostatic latent image is formed on a photo conductor 10 of this exposure L. With a developing roller 13, a toner is given and this electrostatic latent image is developed. With the gestalt of this operation, developing-roller 13K for developing-roller 13M and blacks developing-roller 13Y for yellow, developing-roller 13C for cyanogen, and for Magentas are prepared as a developing roller. When it may have comes to contact a photo conductor 10 selectively and contacts, these developing rollers 13Y, 13C, 13M, and 13K give the toner of the yellow, cyanogen, a Magenta, or the blacks to the front face of a photo conductor 10, and develop the electrostatic latent image on a photo conductor 10. The developed toner image is imprinted on the medium imprint belt 36 as a medium imprint object mentioned later (primary imprint section Tr1 reference).

[0016] The blade 21 for photo conductors which scratches the toner (residual toner) which cleaning equipment 20 remained to the peripheral face of a photo conductor 10 after the above-mentioned imprint, and has adhered (cleaning blade), With this blade 21, it is scratched and taken, and the falling toner (T) is scooped up and scooped up. A sheet 22, It has the deposition section 23 on which the falling toner is made to deposit, the receptacle section 24 which receives the toner for which this deposition section 23 was overflowed, the screw 25 conveyed in the waste toner bottle which does not illustrate the toner in this receptacle section 24, and the case 26.

[0017] As for the blade 21, the upper part is being fixed to the blade holder 27. As for the blade holder 27, the ends (ends in the direction which intersects perpendicularly with space) are attached rockable to the flanks 26a and 26a (only one side is illustrated) of a case 26 with Shafts 27a and 27a (only one side is illustrated). Between the case 26 and the blade holder 27, the blade energization spring (compression spring) 28 is formed, and point (edge) 21a of a blade 21 contacts the front face of a photo conductor 10 according to the energization force of this blade energization spring 28, and the elastic force of blade 21 self. It saves, and a sheet 22 sets caudad from the contact section C of a blade 21 and a photo conductor 10, contacts a photo conductor 10, and scoops up the toner scratched with the blade 21.

[0018] It saves, and that point 22c separates a gap from photo conductor 10 front face, and is installed, and the sheet 22 forms toner **** (22b) on which this installation section 22b makes the contact section C and its direct lower part U of a photo conductor 10 and a cleaning blade 21 always deposit the toner T scratched by said cleaning blade 21 so that it may show clearly in drawing 2 . That is, the front face of a photo conductor 10 and said toner T

which saves, is formed by installation section 22b of a sheet 22, and was scratched by the contact section C and its direct lower part U of a photo conductor 10 and a cleaning blade 21 with the blade 21 by this deposition section 23 always deposit the deposition section 23 in the gestalt of this operation. It saves, and the sheet 22 is extended in the direction which intersects perpendicularly with space, and the deposition section 23 is continued and formed in the lower part overall length of said contact section C. It saves, the gap of 23d is formed between point (upper bed section) 22c of a sheet 22, and a blade 21, and an excessive toner overflows to said receptacle section 24 among the toners T deposited on said deposition section 23 through this gap of 23d. It saves, and the lower 22a has fixed to clamp-face 26b of a case 26 by the glue line (for example, adhesives) 29, and the sheet 22 touches the photo conductor 10 by the elastic force of itself. A sign C1 shows the contact section. It saves, and between that point 22c and said lower 22a, the sheet 22 touches the photo conductor 10 and forms said toner **** 22b in the upper part [section / C1 / this / contact]. if it has another way of speaking, it can set in the gestalt of this operation — it saved and, generally the sheet 22 was known conventionally — it will save, and will consist of sheets for a long time (related with the hand of cut of the image support 10 for a long time), and said toner **** 22b will be constituted from this portion (installation section) formed for a long time. That is, plate-like [which was generally known conventionally / which saved and was formed for a long time than a sheet / thin] can save, and the above-mentioned toner **** 22b can be formed by setting a sheet 22 caudad rather than the point 22c, and contacting it to a photo conductor 10. Therefore, toner **** 22b is formed so that the gap on the front face of a photo conductor may become large gradually toward the upper part.

[0019] this — by saving, since the sheet 22 touches the photo conductor 10, it fine-vibrates according to a revolution of a photo conductor 10. Although it will circulate clockwise according to the hand of cut (it sets to drawing 2 and is a counterclockwise rotation) of a photo conductor 10 as an arrow head a shows the toner T deposited in the operation of said toner **** 22b to drawing 2 , the toner of the diameter of a granule becomes comparatively according to an operation of the above-mentioned fine oscillation that the contact section C of a photo conductor 10 and a blade 21 is easy to be supplied in this case. When it explains in detail, as an arrow head a1 shows the toner of the surplus which is held in the deposition section 23 and stopped going out in the process through which the deposited toner T circulates, it will overflow to said receptacle section 24, but a photo conductor 10 and when it saves and the sheet 22 is fine-vibrating, in the upper part of the deposition section 23, the toner of the diameter of a large drop meeting-comes to be easy comparatively. Therefore, most toners which receive as the arrow head a1 showed, and are overflowed to the section 24 turn into a toner of the diameter of a large drop (the toner of the diameter of a large drop overflowing preferentially), and the toner of the diameter of a granule will remain in the deposition section 23 comparatively as a result. For this reason, the toner of the diameter of a granule becomes comparatively that the contact section C of a photo conductor 10 and a blade 21 is easy to be supplied. In addition, even if foreign matters, such as paper powder, mix in Toner T, since a foreign matter will overflow preferentially, it is hard coming to also generate the situation where a foreign matter will be supplied to said contact section C, according to an operation of the above-mentioned fine oscillation.

[0020] moreover, it can set in the gestalt of this operation — it saves, and the surface roughness Rz of a sheet 22 is constituted so that it may become 1/5 or less [of toner particle size]. Furthermore, it saves, and the frictional electrification sequence of a sheet 22 has chosen the material so that it may become the direction which electrifies a toner in predetermined electrification polarity. That is, it saves and the sheet 22 consists of materials which electrify a toner in predetermined electrification polarity. In addition, the case 26 consists of hard material, for example, hard synthetic resin.

[0021] The above cleaning equipments are constituted by the case 26 as a unit, and are attached in the frame which the main part of image formation equipment does not illustrate removable.

[0022] Medium imprint equipment 30 has endless-like the medium imprint belt 36, the secondary imprint roller 37, and the cleaning means 38 as a medium imprint object laid by a driving roller 31, four follower rollers 32, 33, 34, and 35, and each [these] roller.

[0023] the gearing with which the driving roller 31 was fixed to the edge and which does not illustrate meshes with the gearing for actuation of a photo conductor 10 (not shown) — a photo conductor 10 and abbreviation — revolution actuation is carried out with the same peripheral speed — having — therefore, the medium imprint belt 36 — a photo conductor 10 and abbreviation — circulation actuation is carried out in the direction of a graphic display arrow head with the same peripheral speed. The follower roller 35 is a primary imprint roller, and the pressure welding of it is carried out to the photo conductor 10 through the medium imprint belt 36, and it forms the primary imprint section Tr1 between a photo conductor 10 and the medium imprint belt 36 in this pressure-welding section. The electrode roller which is not illustrated through the medium imprint belt 36 in a driving roller 31 is arranged, and primary imprint voltage is impressed to the medium imprint belt 36 through the electrode roller. The follower roller 32 is a tension roller and is energizing the medium imprint belt 36 in the flare direction with the energization means which is not illustrated. The follower roller 33 is a backup roller which forms the secondary imprint section Tr2. Opposite arrangement of the secondary imprint roller 37 is carried out through the medium imprint belt 36 at this backup roller 33. The secondary imprint roller 37 can attach and detach to the medium imprint belt 36 according to the attachment-and-detachment device which is not illustrated. Secondary imprint voltage is impressed to the secondary imprint roller 37. The follower roller 34 is a backup roller for the cleaning means 38. the medium imprint which scratches the toner (secondary imprint residual toner) which the cleaning means 38 contacted the medium imprint belt 36, and has remained and adhered to the peripheral face — the body and its function — it consists of blades. this medium imprint — the body and its function — a blade can attach and detach to the

medium imprint belt 36 according to the attachment-and-detachment device which is not illustrated. in addition, a medium imprint — the body and its function — the toner which failed to be scratched by the blade 38 is not illustrated — popularity is won and it is conveyed by the section with a carrier eclipse and the screw which is not illustrated to a waste toner bottle.
[0024] The toner image with which the toner image on a photo conductor 10 was imprinted on the medium imprint belt 36, and was imprinted on the medium imprint belt 36 in the primary imprint section Tr1 in the process in which circulation actuation of the medium imprint belt 36 is carried out is imprinted by the record media P, such as a form which is the object for an imprint supplied between the secondary imprint rollers 37, in the secondary imprint section Tr2. It is fed with a record medium P from the feed equipment which is not illustrated, and it is supplied to the secondary imprint section Tr2 to predetermined timing.
[0025] The actuation of the above whole image formation equipment is as follows.
(i) If the printing command signal (image formation signal) from the host computer (personal computer etc.) which is not illustrated is inputted into the control section of image formation equipment, the medium imprint belt 36 will be in a firm-bridging condition by actuation of a tension roller 32, and revolution actuation of a photo conductor 10, a developing roller 13, and the medium imprint belt 36 will be carried out by the driving means which is not illustrated.
(ii) The peripheral face of a photo conductor 10 is uniformly charged with the electrification roller 12.
(iii) With the exposure unit which is not illustrated, the alternative exposure L according to the image information of the 1st amorous glance (for example, Magenta (M)) is made by the peripheral face of the photo conductor 10 charged uniformly, and the electrostatic latent image for Magentas is formed in it.
(iv) Only developing-roller 13M for the 1st amorous glance (for example, Magenta) contacts a photo conductor 10, the above-mentioned electrostatic latent image is developed by this, and the toner image of the 1st amorous glance (for example, Magenta) is formed on a photo conductor 10 of it.
(v) The primary imprint voltage of the electrification polarity and reversed polarity of the above-mentioned toner is impressed to the medium imprint belt 36, and the toner image formed on the photo conductor 10 is imprinted on the medium imprint belt 36 in the primary imprint section Tr1 Tr1, i.e., the pressure-welding section of a photo conductor 10 and the medium imprint belt 36. At this time, the secondary imprint roller 37 and the cleaning means 38 are estranged from the medium imprint belt 36.
(vi) After the toner (primary residual toner) which remains on a photo conductor 10 is removed by the blade 21 for photo conductors, a photo conductor 10 is discharged by the electric discharge light from the electric discharge means which is not illustrated.
(vii) Actuation of above-mentioned (ii) - (vi) is repeated if needed. That is, according to the content of the above-mentioned printing command signal, it is repeated with the 2nd amorous glance, the 3rd amorous glance, and the 4th amorous glance, and the toner image according to the content of the above-mentioned printing command signal piles up on the medium imprint belt 36, and is formed on the medium imprint belt 36.
(viii) Just before a record medium P is supplied to predetermined timing and the head of a record medium P reaches the secondary imprint section Tr2, or after reaching (in the location of the request on a record medium P in short) While the secondary imprint roller 37 is pressed by the medium imprint belt 36 to the timing by which the toner image on the medium imprint belt 36 is imprinted, secondary imprint voltage is impressed, and the toner image on the medium imprint belt 36 (fundamentally full color image) is imprinted on a record medium P. moreover, a medium imprint — the body and its function — a blade 38 contacts the medium imprint belt 36, and the toner (secondary residual toner) which remains on the medium imprint belt 36 after a secondary imprint is removed.
(ix) By passing the anchorage device which a record medium P does not illustrate, a toner image is established on a record medium P, and a record medium P is discharged out of equipment after that.
(x) If the predetermined time input of the above-mentioned image formation signal is not carried out or equipment is turned off after actuation of the above (i) - (ix) gets used, the firm-bridging condition of the medium imprint belt 36 will be canceled by actuation of a tension roller.
[0026] According to the above image formation equipments, the following operation effects are acquired.
(a) The toner which remains on the image support 10 after the toner image on the image support 10 which is the body of revolution which supports a toner image is imprinted is taken [it scratches it and] and removed by the cleaning blade 21 in contact with the front face of the image support 10, this scratched toner saves, and it is saved with a sheet 22. And according to this image formation equipment, save, and point 22c of a sheet 22 separates a gap from image support 10 front face, and is installed. Since this installation section 22b forms toner **** (22b) on which the contact section C and its direct lower part U of the image support 10 and a cleaning blade 21 are made to always deposit the toner scratched by the cleaning blade 21 According to the operation as lubricant of the toner T deposited on said contact section C and its direct lower part U, it is hard to produce **** of a blade 21, and it becomes so that it may explain below. That is, since the toner scratched with the blade 21 has always accumulated on the contact section C and its direct lower part U of the image support 10 and a cleaning blade 21, a toner will always be supplied to the contact section C of the rotating image support 10 and a cleaning blade 21, without being influenced by the image pattern. Since a toner has the operation as lubricant, even when the frictional force between a blade 21 and image support 10 front face declines and the contact pressure and/or the contact angle of a blade 21 are increased as a result by existence of this toner, it is hard coming to generate **** of a blade 21. Moreover, it is hard coming to generate blade **** under a high-humidity/temperature environment for the same reason. As mentioned above, according to the image formation equipment of the gestalt of this operation, even when increasing the contact pressure and/or the contact angle of a cleaning blade 21, it is hard coming to generate ****

of a blade 21. moreover, the cleaning blade 21 — being the so-called — a stick slip — according to this image formation equipment, although behavior has removed the toner, when the frictional force between a blade 21 and image support 10 front face declines, the above-mentioned behavior will be stabilized and the cleaning engine performance will improve further as a result.
[0027] And since toner ****'22b on which the contact section C and its direct lower part U of the image support 10 and a cleaning blade 21 are made to always deposit the toner scratched by the cleaning blade 21 is formed by the installation section 22b which saved, separated image support 10 front face and the gap, and installed point 22c of a sheet 22, the still more nearly following operation effects are acquired. That is, since it saves and the sheet 22 touches the image support 10, it fine-vibrates according to the revolution of the image support 10. although it will circulate through the toner deposited in the operation of toner **** 22b according to the hand of cut of the image support 10, the toner of the diameter of a granule supplies it to the contact section C of the image support 10 and a blade 21 comparatively according to an operation of the above-mentioned fine oscillation in this case — having — being easy — the frictional force between a blade 21 and image support 10 front face falls to fitness further with the toner of this diameter of a granule — things — ** Therefore, the blade mentioned above will get turned up and improvement in depressant action and the cleaning engine performance will be further obtained by fitness. Moreover, since it is formed by the installation section 22b in which it saved into, and toner **** 22b separated image support 10 front face and the gap, and installed point 22c of a sheet 22, circulation of the toner mentioned above will be made efficiently. Therefore, since supply in said contact section C of the toner of the diameter of a granule will also be made comparatively efficiently, the frictional force between a blade 21 and image support 10 front face declines much more certainly, the blade 21 mentioned above will get turned up, and improvement in depressant action and the cleaning engine performance will be obtained much more certainly. furthermore, as a result currently formed by the installation section 22b in which it saved into, and toner **** 22b separated the image support front face and the gap, and installed point 22c of a sheet It saves and the gap of image support 10 front face and said installation section 22b is small in the about one contact section C of a sheet 22 and the image support 10. In the activity early stages of the part and image formation equipment (for example, when it is provided for a user and an activity is started), a toner will accumulate promptly.
[0028] In addition, in the activity early stages of image formation equipment, although it is a short time by the time a toner accumulates, some time amount will be taken, but since lubricant, such as polyvinylidene fluoride, is usually applied on the surface of the blade in this seed image formation equipment in order to prevent blade **** in the early stages of an activity, blade **** does not necessarily arise in the activity first stage until a toner accumulates.

[0029] (b) Since toner **** 22b saves and is formed in the installation section of a sheet 22, save and it becomes unnecessary to prepare the member for toner deposition special in addition to sheet 22. Therefore, components mark are reduced and it is reduced also like an assembler.
(c) Since it saves and the surface roughness Rz of a sheet 22 has become 1/5 or less [of toner particle size], save and the circulation effectiveness of the toner which it becomes easy to move a toner and deposited the front face of a sheet 22 improves further. Therefore, the frictional force between a blade 21 and image support 10 front face declines much more certainly, the blade 21 mentioned above will get turned up, and improvement in depressant action and the cleaning engine performance will be obtained much more certainly.
(d) Since it consists of materials with which it saves and a sheet 22 electrifies a toner in predetermined electrification polarity, the still more nearly following operation effects are acquired. Namely, the toner (residual toner) which remains on the image support 10 after the toner image on the image support 10 is imprinted is in the condition that that from which what was charged in a certain polarity, and it became reversed polarity was intermingled. Therefore, when this is left, there is a possibility that the circulation effectiveness of the toner deposited by the adsorption power of toners as mentioned above may fall. On the other hand, since it consists of materials with which it saves and a sheet 22 electrifies a toner in predetermined electrification polarity according to the image formation equipment of the gestalt of this operation The deposited toner will be arranged with like-pole nature by saving, after depositing, contacting a sheet 22 or ****ing, in case the residual toner adhering to image support 10 front face saves and between sheets 22 (said contact portion C1) is passed through. Therefore, the circulation effectiveness of the deposited toner T will improve further, the frictional force between a blade 21 and image support 10 front face declines much more certainly, the blade mentioned above will get turned up and improvement in depressant action and the cleaning engine performance will be obtained much more certainly.
(e) Since it has a cleaning means 38 to remove the medium imprint object 36 and its secondary residual toner according to the image formation equipment of the gestalt of this operation, the following operation effects are acquired. Supposing it makes the toner image formed on the photo conductor 10 the configuration which the record media P, such as a form, are made to imprint directly, without establishing the medium imprint object 36, foreign matters, such as paper powder which adhered to photo conductor 10 front face from the form etc. in the imprint section (Tr1 reference), will be scratched by the blade 21 with a residual toner. Therefore, supposing the toner scratched with the blade 21 makes it the configuration always deposited on the contact section C and its direct lower part U of a photo conductor 10 and a blade 21, foreign matters, such as paper powder, will also be deposited with a toner, and there is a possibility that photo conductor 10 front face or a blade 21 may be deleted with this paper powder etc. On the other hand, since it has a cleaning means 38 to remove the medium imprint object 36 and its secondary residual toner according to the image formation equipment of the gestalt of this operation, the paper powder which adhered to the medium imprint object 36 from the form etc. in the secondary imprint section Tr2 will

be removed by the cleaning means 38 with a secondary residual toner. In the image formation equipment of the gestalt of this operation, namely, contacting in the primary imprint section Tr1 to a photo conductor 10 Since it is the medium imprint object 36 in the condition of paper powder etc. having been removed and having become beautiful, In spite of being the configuration which the toner (primary residual toner) scratched with the blade 21 always deposits on the contact section C and its direct lower part U of a photo conductor 10 and a blade 21 The situation where foreign matters, such as paper powder, will accumulate with a primary residual toner stops arising (the amount will become very little even if a foreign matter accumulates). And as mentioned above, even if foreign matters, such as paper powder, mix in the toner T to deposit, since a foreign matter will overflow preferentially, it is very hard coming to generate the situation where a foreign matter will be supplied to said contact section C, according to an operation of the above-mentioned fine oscillation. Therefore, in spite of being the configuration which the toner (primary residual toner) T scratched with the blade 21 always deposits on the contact section C and its direct lower part U of a photo conductor 10 and a blade 21, a possibility of saying that photo conductor 10 front face or a blade 21 will be deleted with paper powder etc. disappears.

[0030] <Gestalt of the 2nd operation> drawing 3 is the enlarged view in the gestalt of operation of the 2nd of the image formation equipment concerning this invention in which saving into and showing sheet 22 portion. In this drawing, the same sign is given to the same portion as a gestalt thru/or the corresponding portion of implementation of the above 1st.

[0031] The point that the gestalt of this operation differs from the gestalt of implementation of the above 1st is saved, carries out crookedness formation of the sheet 22 beforehand at the character type of "**", and is in the point of having made it make the image support 10 contacting by 22d of that flection, and there is no change in other points. Also according to the gestalt of this operation, the operation effect by the gestalt of implementation of the above 1st and the same operation effect are acquired.

[0032] <Gestalt of the 3rd operation> drawing 4 (a) is the enlarged view in the gestalt of operation of the 3rd of the image formation equipment concerning this invention in which saving into and showing a sheet 22 and its supporter material 40. In this drawing, the same sign is given to the same portion as a gestalt thru/or the corresponding portion of implementation of the above 1st.

[0033] The point that the gestalt of this operation differs from the gestalt of implementation of the above 1st is in the point in which the supporter material 40 which saves and supports a sheet 22 towards the image support 10 side in the about one contact section C with the image support 10 is formed, and is, and there is no change in other points. The supporter material 40 is a plate which saves in the direction which intersects perpendicularly with space, and has the same length as a sheet 22, it was saved, has fixed by glue line 29a to lower 22a of a sheet 22, and has fixed to clamp-face 26b of a case 26 by glue line 29b with this another supporter material 40. Up 40a of the supporter material 40 is prolonged to the about one contact section C with the image support 10, was saved and has backed up the sheet 22. Also according to the gestalt of this operation, the operation effect by the gestalt of the 1st operation and the same operation effect are acquired. Furthermore, since it saves and the sheet 22 is supported by the supporter material 40 towards the image support 10 side in the about one contact section C with the image support 10, the following operation effects are acquired. If it is the configuration which a toner deposits on toner **** (installation section) 22b which saved and installed the sheet 22, the inclination to save and for the contact force of a sheet 22 and the image support 10 to become weak with the weight of the toner will arise. On the other hand, since it saves and the sheet 22 is supported by the supporter material 40 towards the image support 10 side with the gestalt of this operation in the about one contact section C with the image support 10 In spite of forming toner **** by said installation section 22b, it will save, the contact force in the contact section C1 of a sheet 22 and the image support 10 will be secured, and the leakage of a toner will be prevented certainly. moreover — since it saved and the supporter material 40 has fixed on the sheet 22 — saving — a sheet 22 — also getting twisted — it will be controlled.

[0034] <Gestalt of the 4th operation> drawing 4 (b) is the enlarged view in the gestalt of operation of the 4th of the image formation equipment concerning this invention in which saving into and showing a sheet 22 and its supporter material 41. In this drawing, the same sign is given to the same portion as a gestalt thru/or the corresponding portion of implementation of the above 1st.

[0035] The point that the gestalt of this operation differs from the gestalt of implementation of the above 1st is in the point in which different supporter material 41 from the gestalt of implementation of the above 3rd which saves and supports a sheet 22 towards the image support 10 side in the about one contact section C with the image support 10 is formed, and is, and there is no change in other points. The supporter material 41 of the gestalt of this operation is the plate of the abbreviation mold for L characters which saves in the direction which intersects perpendicularly with space, and has the same length as a sheet 22, and that lower 41a fixes in a case 26 by glue line 29c, and that up 41b saves and is supporting the sheet 22 in the upper part somewhat rather than contact section C1 portion with the image support 10. It saves with up 41b of the supporter material 41, and the contact section with a sheet 22 may fix with adhesives etc., and does not need to fix. Also according to the gestalt of this operation, the operation effect by the gestalt of implementation of the above 3rd and the same operation effect are acquired.

[0036] As mentioned above, although the gestalt of operation of this invention was explained, this invention is not limited to the gestalt of the above-mentioned operation, and deformation implementation is possible for it suitably within the limits of the summary of this invention. For example, although the gestalt of the above-mentioned implementation explained the case where image support was a photo conductor, this invention can be applied also when image support is a medium imprint object. Moreover, although the gestalt of the above-mentioned

implementation explained the case where image support (photo conductor) was cylindrical, this invention can be applied also when image support is a belt-like.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In recent years, in the image formation equipment using electrophotographic technology, high-definition-izing (diameter[of a granule]-izing of a toner), improvement in the speed, and reinforcement are desired. In order to meet this want, especially the want of high-definition-izing (diameter[of a granule]-izing of a toner), in order to remove the toner which remained on image support after the toner image imprint good, it is necessary to raise cleaning nature, and it possible to increase the contact pressure and/or the contact angle of a cleaning blade over the front face of image support as one policy for it.
[0005] However, if the contact pressure of a cleaning blade to the front face of image support is increased, since the frictional force between a blade and an image support front face will become large, when especially a contact angle is enlarged, the problem that a blade becomes easy to get turned up arises. It especially becomes easy to be generated the time of the residual toner in an image support front face forming few image patterns that he can be this blade earnestly, and under a high-humidity/temperature environment.
[0006] The object of this invention is to offer the image formation equipment which **** of a blade cannot produce easily, even when solving the above problems and increasing the contact pressure and/or the contact angle of a cleaning blade.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

MEANS

[Means for Solving the Problem] In order to attain the above-mentioned object image formation equipment according to claim 1 A front face of image support which is the body of revolution which supports a toner image, and this image support is contacted. A cleaning blade which scratches a toner which remains on image support after a toner image on image support is imprinted, Rather than the contact section of image support and a cleaning blade, set caudad and image support is contacted. It is image formation equipment which scoops up a toner scratched by said cleaning blade and which saved and was equipped with a sheet. It saves, and a point of a sheet separates a gap from an image support front face, and is installed, and this installation section is characterized by forming toner **** on which the contact section and its direct lower part of said image support and cleaning blade are made to always deposit said toner scratched by said cleaning blade. It is characterized by preparing said supporter material which saves and supports a sheet towards an image support side [near the contact section with said image support], and being in image formation equipment according to claim 2 in image formation equipment according to claim 1. In image formation equipment according to claim 1 or 2, it saves and image formation equipment according to claim 3 is characterized by said thing [that the surface roughness Rz of a sheet is 1/5 or less / of toner particle size]. In addition, "toner particle size" is the semantics of number mean particle diameter of a toner used with this image formation equipment. Image formation equipment according to claim 4 is characterized by consisting of said materials with which it saves and a sheet electrifies a toner in predetermined electrification polarity in claims 1 and 2 or image formation equipment given in three.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The outline positive cross section showing the gestalt of operation of the 1st of the image formation equipment concerning this invention.
[Drawing 2] With the enlarged view of the important section of the gestalt of the 1st operation, it is operation explanatory drawing.
[Drawing 3] The enlarged view in the gestalt of operation of the 2nd of the image formation equipment concerning this invention in which saving into and showing sheet 22 portion.
[Drawing 4] For (a), (b) is the enlarged view in the gestalt of operation of the 3rd of the image formation equipment concerning this invention in which saving into and showing a sheet 22 and the supporter material 40, and the enlarged view in the gestalt of operation of the 4th of the image formation equipment concerning this invention in which saving into and showing a sheet 22 and the supporter material 41.
[Drawing 5] (a) and (b) are explanatory drawing of the conventional technology.
[Description of Notations]
T Toner
10 Photo Conductor (Image Support)
21 Cleaning Blade
22 Save and it is Sheet.
22b Installation section (toner ****)
22c Point
26 Case
40 41 Supporter material
C The contact section of a blade and a photo conductor
U Direct lower part
C1 It saves and is the contact section of a sheet and a photo conductor.

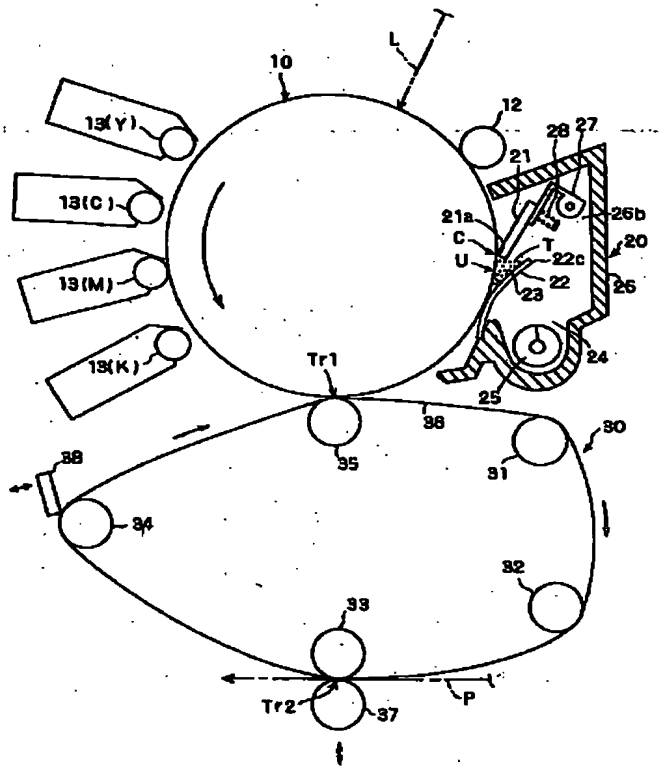
[Translation done.]

* NOTICES *

DRAWINGS

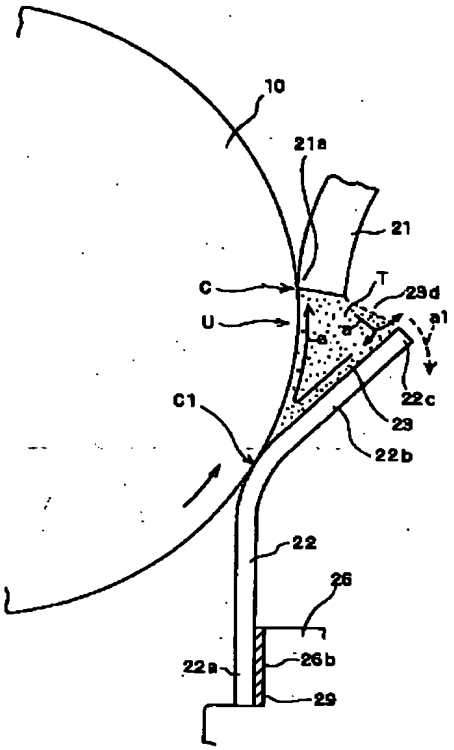
[Drawing 1]

7 4 1 0 9 − 1

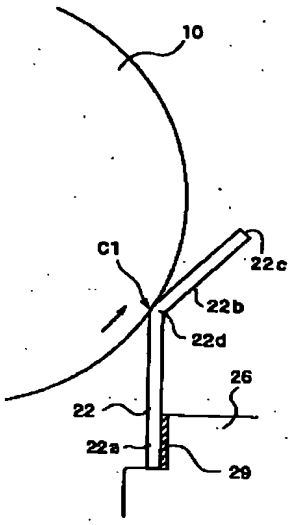


[Drawing 2]

7 4 1 0 9 − 2

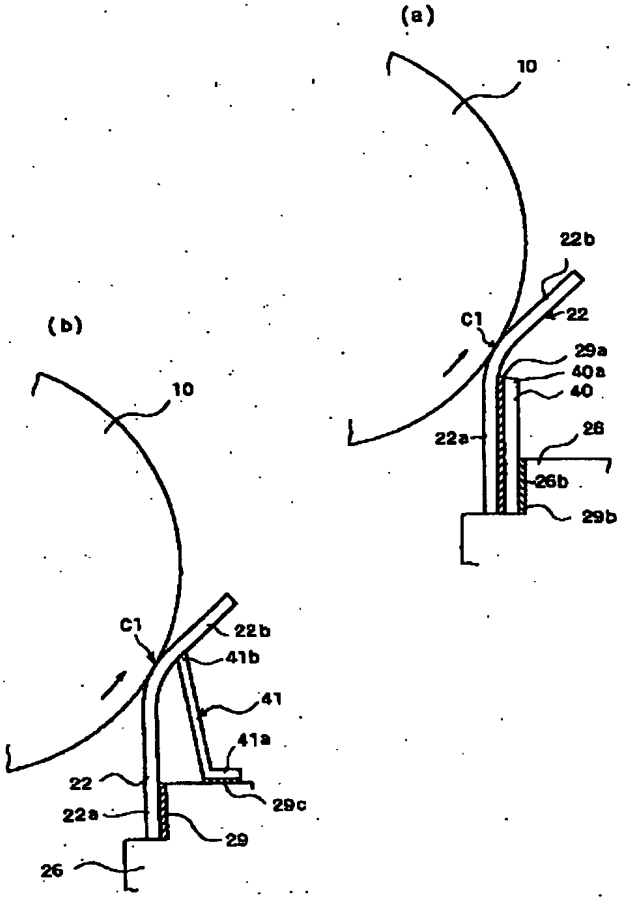


[Drawing 3]



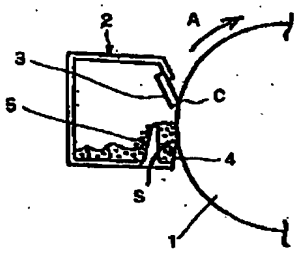
[Drawing 4]

7 4 1 0 9 − 4

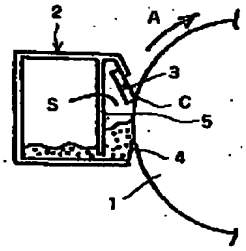


[Drawing 5]

(a)



(b)



[Translation done.]

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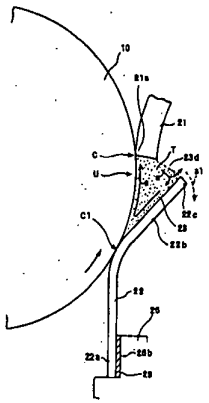
最終頁に続く

(54)【発明の名称】　画像形成装置

(57)【要約】
【課題】　クリーニングブレードの接触圧および／または接触角を増大させた場合でもブレードの捲れが生じ難くする。
【解決手段】　トナー像を担持する回転体である像担持体１０の表面に接触して像担持体上のトナー像が転写された後に像担持体上に残留しているトナーを掻き取るブレード２１と、像担持体とブレードとの接触部Ｃよりも下方において像担持体に接触しブレードで掻き取られたトナーをすくうすくいシート２２とを備え、すくいシートの先端部２２ｃが像担持体表面と間隔を隔てて延設され、この延設部２２ｂが、ブレードで掻き取られたトナーを像担持体とブレードとの接触部Ｃおよびその直下部Ｕに常時堆積させるトナー溜部を形成している。

74109-2



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【特許請求の範囲】
【請求項１】　トナー像を担持する回転体である像担持体と、この像担持体の表面に接触して、像担持体上のトナー像が転写された後に像担持体上に残留しているトナーを掻き取るクリーニングブレードと、像担持体とクリーニングブレードとの接触部よりも下方において像担持体に接触し、前記クリーニングブレードで掻き取られたトナーをすくうすくいシートとを備えた画像形成装置であって、
前記すくいシートの先端部が像担持体表面と間隔を隔てて延設され、この延設部が、前記クリーニングブレードで掻き取られたトナーを前記像担持体とクリーニングブレードとの接触部およびその直下部に常時堆積させるトナー溜部を形成していることを特徴とする画像形成装置。
【請求項２】　前記すくいシートを、前記像担持体との接触部近くにおいて像担持体側に向けて支持する支持部材が設けられいることを特徴とする請求項１記載の画像形成装置。
【請求項３】　前記すくいシートの表面粗さＲｚが、トナー粒径の１／５以下であることを特徴とする請求項１または２記載の画像形成装置。
【請求項４】　前記すくいシートが、トナーを所定帯電極性に帯電させる材料で構成されていることを特徴とする請求項１，２，または３記載の画像形成装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、電子写真技術を用いて画像を形成するプリンター、ファクシミリ、複写機等の画像形成装置に関する。特に、そのトナー像を担持する像担持体上の残留トナーを除去するクリーニングブレード（以下、単にブレードともいう）を用いたクリーニング装置に関するものである。
【０００２】
【従来の技術】一般に、電子写真技術を用いた画像形成装置は、外周面に感光層を有する感光体（像担持体の一例）と、この感光体の外周面を一様に帯電させる帯電手段と、この帯電手段により一様に帯電させられた外周面を選択的に露光して静電潜像を形成する露光手段と、この露光手段により形成された静電潜像に現像剤であるトナーを付与して可視像（トナー像）とする現像手段と、この現像手段により現像されたトナー像を用紙等の転写媒体に転写させる転写手段と、感光体の表面に接触して、転写後に感光体の外周面に残存しているトナー（残留トナー）を掻き取って除去するクリーニングブレードを用いたクリーニング装置とを有している。
【０００３】また、転写手段としては、感光体上のトナー像を用紙等の記録媒体に転写するために、感光体上に形成されたトナー像が転写（一次転写）されてこれを担持し、このトナー像をさらに記録媒体に転写（二次転写）する中間転写体（像担持体の一例）を備えたものが知られている。この中間転写体にも、トナー像転写後にその表面に残存しているトナー（残留トナー）を掻き取って除去するクリーニングブレードが設けられる。
【０００４】
【発明が解決しようとする課題】近年、電子写真技術を用いた画像形成装置においては、高画質化（トナーの小粒径化）、高速化、長寿命化が望まれている。この要望、特に高画質化（トナーの小粒径化）の要望に応えるには、トナー像転写後に像担持体上に残留したトナーを良好に除去するためにクリーニング性を向上させる必要があり、そのための一つの方策として、像担持体の表面に対するクリーニングブレードの接触圧および／または接触角を増大させることが考えられる。
【０００５】しかしながら、像担持体の表面に対するクリーニングブレードの接触圧を増大させると、ブレードと像担持体表面との間の摩擦力が大きくなるため、特に接触角を大きくした場合にはブレードが捲れ易くなるという問題が生じる。このブレードの捲れは、像担持体表面における残留トナーが少ない画像パターンを形成したときや、高温高湿環境下において特に生じ易くなる。
【０００６】本発明の目的は、以上のような問題を解決し、クリーニングブレードの接触圧および／または接触角を増大させた場合でもブレードの捲れが生じ難い画像形成装置を提供することにある。
【０００７】
【課題を解決するための手段】上記目的を達成するために請求項１記載の画像形成装置は、トナー像を担持する回転体である像担持体と、この像担持体の表面に接触して、像担持体上のトナー像が転写された後に像担持体上に残留しているトナーを掻き取るクリーニングブレードと、像担持体とクリーニングブレードとの接触部よりも下方において像担持体に接触し、前記クリーニングブレードで掻き取られたトナーをすくうすくいシートとを備えた画像形成装置であって、前記すくいシートの先端部が像担持体表面と間隔を隔てて延設され、この延設部が、前記クリーニングブレードで掻き取られたトナーを前記像担持体とクリーニングブレードとの接触部およびその直下部に常時堆積させるトナー溜部を形成していることを特徴とする。請求項２記載の画像形成装置は、請求項１記載の画像形成装置において、前記すくいシートを、前記像担持体との接触部近くにおいて像担持体側に向けて支持する支持部材が設けられいることを特徴とする。請求項３記載の画像形成装置は、請求項１または２記載の画像形成装置において、前記すくいシートの表面粗さＲｚが、トナー粒径の１／５以下であることを特徴とする。なお、「トナー粒径」とは、この画像形成装置で使用されるトナーの個数平均粒径という意味である。
請求項４記載の画像形成装置は、請求項１，２，または３記載の画像形成装置において、前記すくいシートが、

トナーを所定帯電極性に帯電させる材料で構成されていることを特徴とする。

【０００８】

【作用効果】請求項１記載の画像形成装置によれば、トナー像を担持する回転体である像担持体上のトナー像が転写された後に像担持体上に残留しているトナーが、像担持体の表面に接触するクリーニングブレードによって掻き取られて除去され、この掻き取られたトナーがすくいシートですくわれる。そして、この請求項１記載の画像形成装置によれば、前記すくいシートの先端部が像担持体表面と間隔を隔てて延設され、この延設部が、前記クリーニングブレードで掻き取られたトナーを前記像担持体とクリーニングブレードとの接触部およびその直下部に常時堆積させるトナー溜部を形成しているので、前記接触部およびその直下部に堆積されているトナーの滑剤としての作用によって、以下に説明するようにブレードの捲れが生じ難くなる。すなわち、ブレードで掻き取られたトナーが像担持体とクリーニングブレードとの接触部およびその直下部に常時堆積しているので、回転する像担持体と、クリーニングブレードとの接触部には、画像パターンに影響されることなく常にトナーが供給されることとなる。トナーには滑剤としての作用があるため、このトナーの存在によって、ブレードと像担持体表面との間の摩擦力が低下し、結果として、ブレードの接触圧および／または接触角を増大させた場合でもブレードの捲れが生じ難くなる。また同様の理由により、高温高湿環境下においてもブレード捲れが生じ難くなる。以上のように、この請求項１記載の画像形成装置によれば、クリーニングブレードの接触圧および／または接触角を増大させた場合でもブレードの捲れが生じ難くなる。また、クリーニングブレードは、いわゆるスティックスリップなる挙動によってトナーを除去しているが、この請求項１記載の画像形成装置によれば、ブレードと像担持体表面との間の摩擦力が低下することによって、上記挙動が安定し、結果として、クリーニング性能が一層向上することとなる。

【０００９】しかも、クリーニングブレードで掻き取られたトナーを像担持体とクリーニングブレードとの接触部およびその直下部に常時堆積させるトナー溜部は、すくいシートの先端部を像担持体表面と間隔を隔てて延設したその延設部で形成されているので、さらに次のような作用効果が得られる。すなわち、すくいシートは像担持体に接触しているので、像担持体の回転に応じて微振動する。前記トナー溜部の作用で堆積されたトナーは、像担持体の回転方向に応じて循環することとなるが、この際、上記微振動の作用によって、比較的小粒径のトナーが像担持体とブレードとの接触部に供給され易くなり、この小粒径のトナーによって、ブレードと像担持体表面との間の摩擦力がより一層良好に低下することなる。したがって、上述したブレードの捲れ抑制作用およびクリーニング性能の向上が、より一層良好に得られることとなる。また、トナー溜部が、すくいシートの先端部を像担持体表面と間隔を隔てて延設したその延設部で形成されているので、前述したトナーの循環が効率よくなされることとなる。したがって、比較的小粒径のトナーの前記接触部への供給も効率よくなされることとなるので、ブレードと像担持体表面との間の摩擦力が一層確実に低下し、上述したブレードの捲れ抑制作用およびクリーニング性能の向上が、一層確実に得られることとなる。さらに、トナー溜部が、すくいシートの先端部を像担持体表面と間隔を隔てて延設したその延設部で形成されている結果として、すくいシートと像担持体との接触部近くにおいては像担持体表面と前記延設部の間隔が小さくなっており、その分、画像形成装置の使用初期においてトナーが速やかに堆積されることとなる。

【００１０】なお、従来のクリーニング装置として、図５（ａ）あるいは（ｂ）に示すように、矢印Ａ方向へ回転する像担持体１とクリーニングブレード３との接触部Ｃの下方に、接触部Ｃと間隔を隔てて設けたスペースＳにトナーを堆積させ、この堆積したトナーによって、紙から析出した各種異物を除去しようとしたものが知られているが（特開平１－１６１２８８号公報）、この従来のクリーニング装置では、像担持体１とクリーニングブレード３との接触部Ｃの下方に接触部Ｃと間隔を隔てて設けたスペースＳにトナーが堆積され、上記請求項１記載の発明のように像担持体とクリーニングブレードとの接触部およびその直下部にトナーが堆積されるわけではなく、また、すくいシート４の延設部でトナー溜部が形成されているわけでもないので、請求項１記載の発明による上記作用効果は得られない。

【００１１】請求項２記載の画像形成装置によれば、請求項１記載の画像形成装置において、前記すくいシートを、前記像担持体との接触部近くにおいて像担持体側に向けて支持する支持部材が設けられいるので、前記延設部でトナー溜部が形成されているにもかかわらず、すくいシートと像担持体との接触部におけるトナーの漏れが確実に防止されることとなる。請求項３記載の画像形成装置によれば、請求項１または２記載の画像形成装置において、前記すくいシートの表面粗さＲｚが、トナー粒径の１／５以下となっているので、すくいシートの表面をトナーが移動し易くなり、堆積されたトナーの循環効率がさらに向上する。したがって、ブレードと像担持体表面との間の摩擦力がより一層確実に低下し、上述したブレードの捲れ抑制作用およびクリーニング性能の向上が、より一層確実に得られることとなる。請求項４記載の画像形成装置によれば、請求項１，２，または３記載の画像形成装置において、前記すくいシートが、トナーを所定帯電極性に帯電させる材料で構成されているので、さらに次のような作用効果が得られる。すなわち、像担持体上のトナー像が転写された後に像担持体上に残

留しているトナー（残留トナー）は、ある極性に帯電されたものと、それとは逆極性となったものとが混在した状態となっている。したがってこれを放置した場合には、トナー同士の吸着力によって、上述したようにして堆積されたトナーの循環効率が低下するおそれがある。これに対し、この請求項４記載の画像形成装置によれば、前記すくいシートが、トナーを所定帯電極性に帯電させる材料で構成されているので、像担持体表面に付着している残留トナーがすくいシートとの間をすり抜ける際に、また、堆積された後にすくいシートと接触しあいは摺接することによって、堆積されたトナーが同極性にそろえられることとなる。したがって、堆積されたトナーの循環効率がさらに向上し、ブレードと像担持体表面との間の摩擦力がより一層確実に低下し、上述したブレードの捲れ抑制作用およびクリーニング性能の向上が、より一層確実に得られることとなる。

【００１２】

【発明の実施の形態】以下、本発明の実施の形態について図面を参照して説明する。

＜第１の実施の形態＞図１は本発明に係る画像形成装置の第１の実施の形態を示す概略正断面図、図２はその要部の拡大図である。

【００１３】この画像形成装置は、イエロー（Ｙ）、シアン（Ｃ）、マゼンタ（Ｍ）、ブラック（Ｋ）の４色のトナーによる現像器を用いてフルカラー画像を形成することのできる装置である。

【００１４】図１において、１０は像担持体としての感光体であり、図示しない適宜の駆動手段によって図示矢印方向に回転駆動される。感光体１０の周りには、その回転方向に沿って、帯電手段としての帯電ローラ１２、現像手段としての現像ローラ１３（Ｙ，Ｃ，Ｍ，Ｋ）、中間転写装置３０、およびクリーニング装置２０が配置されている。

【００１５】帯電ローラ１２は、感光体１０の外周面に当接して外周面を一様に帯電させる。一様に帯電した感光体１０の外周面には、図示しない露光ユニットによって所望の画像情報に応じた選択的な露光Ｌがなされ、この露光Ｌによって感光体１０上に静電潜像が形成される。この静電潜像は、現像ローラ１３でトナーが付与されて現像される。この実施の形態では、現像ローラとして、イエロー用の現像ローラ１３Ｙ、シアン用の現像ローラ１３Ｃ、マゼンタ用の現像ローラ１３Ｍ、およびブラック用の現像ローラ１３Ｋが設けられている。これら現像ローラ１３Ｙ，１３Ｃ，１３Ｍ，１３Ｋは、選択的に感光体１０に当接し得るようになっており、当接したとき、イエロー、シアン、マゼンタ、ブラックのうちのいずれかのトナーを感光体１０の表面に付与して感光体１０上の静電潜像を現像する。現像されたトナー像は、後述する中間転写体としての中間転写ベルト３６上に転写（一次転写部Ｔｒ１参照）される。

【００１６】クリーニング装置２０は、上記転写後に、感光体１０の外周面に残留し付着しているトナー（残留トナー）を掻き取る感光体用ブレード（クリーニングブレード）２１と、このブレード２１によって掻き取られ、落下するトナー（Ｔ）をすくうすくいシート２２と、落下するトナーを堆積させる堆積部２３と、この堆積部２３から溢れ出したトナーを受ける受け部２４と、この受け部２４内のトナーを図示しない廃トナーボトルに搬送するスクリュー２５と、ケース２６とを備えている。

【００１７】ブレード２１は、その上部がブレードホルダ２７に固定されている。ブレードホルダ２７は、その両端（紙面と直交する方向における両端）が軸２７ａ，２７ａ（一方のみ図示）によってケース２６の側部２６ａ，２６ａ（一方のみ図示）に対して揺動可能に取り付けられている。ケース２６とブレードホルダ２７との間には、ブレード付勢バネ（圧縮コイルバネ）２８が設けられており、このブレード付勢バネ２８の付勢力およびブレード２１自身の弾性力によってブレード２１の先端部（稜部）２１ａが感光体１０の表面に接触するようになっている。すくいシート２２は、ブレード２１と感光体１０との接触部Ｃよりも下方において感光体１０に接触し、ブレード２１で掻き取られたトナーをすくうようになっている。

【００１８】図２に明示するように、すくいシート２２は、その先端部２２ｃが感光体１０表面と間隔を隔てて延設され、この延設部２２ｂが、前記クリーニングブレード２１で掻き取られたトナーＴを感光体１０とクリーニングブレード２１との接触部Ｃおよびその直下部Ｕに常時堆積させるトナー溜部（２２ｂ）を形成している。すなわち、この実施の形態における堆積部２３は、感光体１０の表面と、前記すくいシート２２の延設部２２ｂとで形成されており、この堆積部２３によって、感光体１０とクリーニングブレード２１との接触部Ｃおよびその直下部Ｕに、ブレード２１で掻き取られたトナーＴが常時堆積されるようになっている。すくいシート２２は紙面と直交する方向に伸びており、堆積部２３は前記接触部Ｃの下方全長に亘って設けられている。すくいシート２２の先端部（上端部）２２ｃとブレード２１との間には間隔２３ｄが形成されており、この間隔２３ｄを通じて、前記堆積部２３に堆積されたトナーＴのうち余分なトナーが前記受け部２４へと溢れ出すようになっている。すくいシート２２は、その下部２２ａが接着層（例えば接着剤）２９でケース２６の取付面２６ｂに固着されており、それ自身の弾性力で感光体１０と接触している。その接触部を符号Ｃ１で示す。すくいシート２２は、その先端部２２ｃと前記下部２２ａとの間で感光体１０に接触しており、この接触部Ｃ１よりも上部において前記トナー溜部２２ｂを形成している。別の言い方をすれば、この実施の形態におけるすくいシート２２は、

従来一般に知られたすくいシートよりも長く（像担持体１０の回転方向に関して長く）構成されており、この長く形成された部分（延設部）で前記トナー溜部２２ｂを構成していることとなる。すなわち、従来一般に知られたすくいシートよりも長く形成された薄い平板状のすくいシート２２を、その先端部２２ｃよりも下方において感光体１０に接触させることで、上記トナー溜部２２ｂを形成することができる。したがって、トナー溜部２２ｂは、上方に向かって徐々に感光体表面との間隔が大きくなるように形成されている。

【００１９】このすくいシート２２は、感光体１０と接触しているので、感光体１０の回転に応じて微振動する。前記トナー溜部２２ｂの作用で堆積されたトナーＴは、図２に矢印ａで示すように、感光体１０の回転方向（図２において反時計方向）に応じて時計方向に循環することとなるが、この際、上記微振動の作用によって、比較的小粒径のトナーが感光体１０とブレード２１との接触部Ｃに供給され易くなる。詳しく説明すると、堆積したトナーＴが循環する過程で、堆積部２３に収容されきれなくなった余剰のトナーは、矢印ａ１で示すように前記受け部２４へと溢れ出すこととなるが、感光体１０およびすくいシート２２が微振動していることによって、堆積部２３の上部には、比較的大粒径のトナーが集まりやすくなる。したがって、矢印ａ１で示したように受け部２４へと溢れ出すトナーのほとんどは大粒径のトナーとなり（大粒径のトナーが優先的に溢れ出すこととなり）、結果として、堆積部２３には比較的小粒径のトナーが残ることとなる。このため、比較的小粒径のトナーが感光体１０とブレード２１との接触部Ｃに供給され易くなる。なお、トナーＴに仮に紙粉等の異物が混入したとしても、上記微振動の作用によって、異物が優先的に溢れ出すこととなるので、異物が前記接触部Ｃに供給されてしまうという事態も生じにくくなる。

【００２０】また、この実施の形態におけるすくいシート２２の表面粗さＲｚは、トナー粒径の１／５以下となるように構成してある。さらに、すくいシート２２の摩擦帯電系列は、トナーを所定帯電極性に帯電させる方向となるように、その材料を選択してある。すなわち、すくいシート２２は、トナーを所定帯電極性に帯電させる材料で構成されている。なお、ケース２６は、硬質材料、例えば硬質の合成樹脂で構成されている。

【００２１】以上のようなクリーニング装置は、ケース２６によってユニットとして構成されており、画像形成装置本体の図示しないフレームに着脱可能に取り付けられている。

【００２２】中間転写装置３０は、駆動ローラ３１と、４本の従動ローラ３２，３３，３４，３５と、これら各ローラに張架された中間転写体としての無端状の中間転写ベルト３６と、二次転写ローラ３７と、クリーニング手段３８とを有している。

【００２３】駆動ローラ３１は、その端部に固定された図示しない歯車が、感光体１０の駆動用歯車（図示せず）と噛み合うことによって、感光体１０と略同一の周速で回転駆動され、したがって中間転写ベルト３６が感光体１０と略同一の周速で図示矢印方向に循環駆動される。従動ローラ３５は、一次転写ローラであり、中間転写ベルト３６を介して感光体１０に圧接されていて、この圧接部において感光体１０と中間転写ベルト３６との間に一次転写部Ｔｒ１を形成している。駆動ローラ３１には、中間転写ベルト３６を介して図示しない電極ローラが配置され、その電極ローラを介して、中間転写ベルト３６に一次転写電圧が印加されるようになっている。従動ローラ３２はテンションローラであり、図示しない付勢手段によって中間転写ベルト３６をその張り方向に付勢している。従動ローラ３３は、二次転写部Ｔｒ２を形成するバックアップローラである。このバックアップローラ３３には、中間転写ベルト３６を介して二次転写ローラ３７が対向配置される。二次転写ローラ３７は、図示しない接離機構により中間転写ベルト３６に対して接離可能である。二次転写ローラ３７には、二次転写電圧が印加される。従動ローラ３４は、クリーニング手段３８のためのバックアップローラである。クリーニング手段３８は、中間転写ベルト３６と接触してその外周面に残留し付着しているトナー（二次転写残留トナー）を掻き取る中間転写体用ブレードで構成されている。この中間転写体用ブレードは図示しない接離機構によって中間転写ベルト３６に対して接離可能となっている。なお、中間転写体用ブレード３８によって掻き落とされたトナーは、図示しない受け部によって受けられ、図示しないスクリューで廃トナーボトルへと搬送される。

【００２４】中間転写ベルト３６が循環駆動される過程で、一次転写部Ｔｒ１において、感光体１０上のトナー像が中間転写ベルト３６上に転写され、中間転写ベルト３６上に転写されたトナー像は、二次転写部Ｔｒ２において、二次転写ローラ３７との間に供給される転写対象である用紙等の記録媒体Ｐに転写される。記録媒体Ｐは、図示しない給紙装置から給送され、所定のタイミングで二次転写部Ｔｒ２に供給される。

【００２５】以上のような画像形成装置全体の作動は次の通りである。

（ｉ）図示しないホストコンピュータ等（パーソナルコンピュータ等）からの印字指令信号（画像形成信号）が画像形成装置の制御部に入力されると、テンションローラ３２の作動で中間転写ベルト３６が張架状態となり、図示しない駆動手段によって感光体１０、現像ローラ１３、および中間転写ベルト３６が回転駆動される。

（ｉｉ）感光体１０の外周面が帯電ローラ１２によって一様に帯電される。

（ｉｉｉ）一様に帯電した感光体１０の外周面に、図示しない露光ユニットによって第１色目（例えばマゼンタ

（Ｍ））の画像情報に応じた選択的な露光Ｌがなされ、マゼンタ用の静電潜像が形成される。

（ｉｖ）感光体１０には、第１色目（例えばマゼンタ）用の現像ローラ１３Ｍのみが接触し、これによって上記静電潜像が現像され、第１色目（例えばマゼンタ）のトナー像が感光体１０上に形成される。

（ｖ）中間転写ベルト３６には上記トナーの帯電極性と逆極性の一次転写電圧が印加され、感光体１０上に形成されたトナー像が、一次転写部Ｔｒ１すなわち、感光体１０と中間転写ベルト３６との圧接部Ｔｒ１において中間転写ベルト３６上に転写される。このとき、二次転写ローラ３７およびクリーニング手段３８は、中間転写ベルト３６から離間している。

（ｖｉ）感光体１０上に残留しているトナー（一次残留トナー）が感光体用ブレード２１によって除去された後、図示しない除電手段からの除電光によって感光体１０が除電される。

（ｖｉｉ）上記（ｉｉ）～（ｖｉ）の動作が必要に応じて繰り返される。すなわち、上記印字指令信号の内容に応じて、第２色目、第３色目、第４色目、と繰り返され、上記印字指令信号の内容に応じたトナー像が中間転写ベルト３６上において重ね合わされて中間転写ベルト３６上に形成される。

（ｖｉｉｉ）所定のタイミングで記録媒体Ｐが供給され、記録媒体Ｐの先端が二次転写部Ｔｒ２に達する直前にあるいは達した後に（要するに記録媒体Ｐ上の所望の位置に、中間転写ベルト３６上のトナー像が転写されるタイミングで）二次転写ローラ３７が中間転写ベルト３６に押圧されるとともに二次転写電圧が印加され、中間転写ベルト３６上のトナー像（基本的にはフルカラー画像）が記録媒体Ｐ上に転写される。また、中間転写体用ブレード３８が中間転写ベルト３６に当接し、二次転写後に中間転写ベルト３６上に残留しているトナー（二次残留トナー）が除去される。

（ｉｘ）記録媒体Ｐが図示しない定着装置を通過することによって記録媒体Ｐ上にトナー像が定着し、その後、記録媒体Ｐが装置外に排出される。

（ｘ）上記（ｉ）～（ｉｘ）の作動がなれた後、上記画像形成信号が所定時間入力されないかあるいは装置の電源が切られると、テンションローラの作動により中間転写ベルト３６の張架状態が解除される。

【００２６】以上のような画像形成装置によれば、次のような作用効果が得られる。

（ａ）トナー像を担持する回転体である像担持体１０上のトナー像が転写された後に像担持体１０上に残留しているトナーが、像担持体１０の表面に接触するクリーニングブレード２１によって掻き取られて除去され、この掻き取られたトナーがすくいシート２２ですくわれる。そして、この画像形成装置によれば、すくいシート２２の先端部２２ｃが像担持体１０表面と間隔を隔てて延設され、この延設部２２ｂが、クリーニングブレード２１で掻き取られたトナーを像担持体１０とクリーニングブレード２１との接触部Ｃおよびその直下部Ｕに常時堆積させるトナー溜部（２２ｂ）を形成しているので、前記接触部Ｃおよびその直下部Ｕに堆積されているトナーＴの滑剤としての作用によって、以下に説明するようにブレード２１の捲れが生じ難くなる。すなわち、ブレード２１で掻き取られたトナーが像担持体１０とクリーニングブレード２１との接触部Ｃおよびその直下部Ｕに常時堆積しているので、回転する像担持体１０と、クリーニングブレード２１との接触部Ｃには、画像パターンに影響されることなく常にトナーが供給されることとなる。トナーには滑剤としての作用があるため、このトナーの存在によって、ブレード２１と像担持体１０表面との間の摩擦力が低下し、結果として、ブレード２１の接触圧および／または接触角を増大させた場合でもブレード２１の捲れが生じ難くなる。また同様の理由により、高温高湿環境下においてもブレード捲れが生じ難くなる。以上のように、この実施の形態の画像形成装置によれば、クリーニングブレード２１の接触圧および／または接触角を増大させた場合でもブレード２１の捲れが生じ難くなる。また、クリーニングブレード２１は、いわゆるスティックスリップなる挙動によってトナーを除去しているが、この画像形成装置によれば、ブレード２１と像担持体１０表面との間の摩擦力が低下することによって、上記挙動が安定し、結果として、クリーニング性能が一層向上することとなる。

【００２７】しかも、クリーニングブレード２１で掻き取られたトナーを像担持体１０とクリーニングブレード２１との接触部Ｃおよびその直下部Ｕに常時堆積させるトナー溜部２２ｂは、すくいシート２２の先端部２２ｃを像担持体１０表面と間隔を隔てて延設したその延設部２２ｂで形成されているので、さらに次のような作用効果が得られる。すなわち、すくいシート２２は像担持体１０に接触しているので、像担持体１０の回転に応じて微振動する。トナー溜部２２ｂの作用で堆積されたトナーは、像担持体１０の回転方向に応じて循環することとなるが、この際、上記微振動の作用によって、比較的小粒径のトナーが像担持体１０とブレード２１との接触部Ｃに供給され易くなり、この小粒径のトナーによって、ブレード２１と像担持体１０表面との間の摩擦力がより一層良好に低下することとなる。したがって、上述したブレードの捲れ抑制作用およびクリーニング性能の向上が、より一層良好に得られることとなる。また、トナー溜部２２ｂが、すくいシート２２の先端部２２ｃを像担持体１０表面と間隔を隔てて延設したその延設部２２ｂで形成されているので、前述したトナーの循環が効率よくなされることとなる。したがって、比較的小粒径のトナーの前記接触部Ｃへの供給も効率よくなされることとなるので、ブレード２１と像担持体１０表面との間の摩

擦力が一層確実に低下し、上述したブレード２１の捲れ抑制作用およびクリーニング性能の向上が、一層確実に得られることとなる。さらに、トナー溜部２２ｂが、すくいシートの先端部２２ｃを像担持体表面と間隔を隔てて延設したその延設部２２ｂで形成されている結果として、すくいシート２２と像担持体１０との接触部Ｃ１近くにおいては像担持体１０表面と前記延設部２２ｂの間隔が小さくなっており、その分、画像形成装置の使用初期（例えばユーザーに提供されて使用が開始された際）においてトナーが速やかに堆積されることとなる。

【００２８】なお、画像形成装置の使用初期においては、トナーが堆積されるまでに、短時間であるとはいえ多少の時間がかかることとなるが、通常、この種画像形成装置においては、使用初期におけるブレード捲れを防止するために、ブレードの表面にポリフッ化ビニリデン等の滑剤が塗布されているので、トナーが堆積されるまでの使用初期においてもブレード捲れが生じるということはない。

【００２９】（ｂ）トナー溜部２２ｂが、すくいシート２２の延設部で形成されているので、すくいシート２２以外に特別な、トナー堆積用部材を設ける必要がなくなる。したがって、部品点数が削減され、組み立て工程も削減される。

（ｃ）すくいシート２２の表面粗さＲｚが、トナー粒径の１／５以下となっているので、すくいシート２２の表面をトナーが移動し易くなり、堆積されたトナーの循環効率がさらに向上する。したがって、ブレード２１と像担持体１０表面との間の摩擦力がより一層確実に低下し、上述したブレード２１の捲れ抑制作用およびクリーニング性能の向上が、より一層確実に得られることとなる。

（ｄ）すくいシート２２が、トナーを所定帯電極性に帯電させる材料で構成されているので、さらに次のような作用効果が得られる。すなわち、像担持体１０上のトナー像が転写された後に像担持体１０上に残留しているトナー（残留トナー）は、ある極性に帯電されたものと、それとは逆極性となったものとが混在した状態となっている。したがってこれを放置した場合には、トナー同士の吸着力によって、上述したようにして堆積されたトナーの循環効率が低下するおそれがある。これに対し、この実施の形態の画像形成装置によれば、すくいシート２２が、トナーを所定帯電極性に帯電させる材料で構成されているので、像担持体１０表面に付着している残留トナーがすくいシート２２との間（前記接触部分Ｃ１）をすり抜ける際に、また、堆積された後にすくいシート２２と接触しあるいは摺接することによって、堆積されたトナーが同極性にそろえられることとなる。したがって、堆積されたトナーＴの循環効率がさらに向上し、ブレード２１と像担持体１０表面との間の摩擦力がより一層確実に低下し、上述したブレードの捲れ抑制作用およびクリーニング性能の向上が、より一層確実に得られることとなる。

（ｅ）この実施の形態の画像形成装置によれば、中間転写体３６およびその二次残留トナーを除去するクリーニング手段３８を備えているので、次のような作用効果が得られる。仮に、中間転写体３６を設けることなく、感光体１０上に形成されたトナー像を用紙等の記録媒体Ｐに直接転写させる構成にしたとすると、転写部（Ｔｒ１参照）において用紙等から感光体１０表面に付着した紙粉等の異物が、残留トナーとともにブレード２１によって掻き取られることとなる。したがって、ブレード２１で掻き取られたトナーが感光体１０とブレード２１との接触部Ｃおよびその直下部Ｕに常時堆積される構成にしたとすると、トナーとともに紙粉等の異物も堆積されることとなり、この紙粉等によって感光体１０表面あるいはブレード２１が削られてしまうおそれがある。これに対し、この実施の形態の画像形成装置によれば、中間転写体３６およびその二次残留トナーを除去するクリーニング手段３８を備えているので、二次転写部Ｔｒ２において用紙等から中間転写体３６に付着した紙粉等が、クリーニング手段３８によって二次残留トナーとともに除去されることとなる。すなわち、この実施の形態の画像形成装置において、感光体１０に対して一次転写部Ｔｒ１において接触するのは、紙粉等が除去されてきれいになった状態の中間転写体３６であるため、ブレード２１で掻き取られたトナー（一次残留トナー）が感光体１０とブレード２１との接触部Ｃおよびその直下部Ｕに常時堆積される構成であるにもかかわらず、一次残留トナーとともに紙粉等の異物が堆積されてしまうという事態が生じなくなる（仮に異物が堆積されるとしても、その量は極めて少量となる）。しかも、前述したように、堆積されるトナーＴに仮に紙粉等の異物が混入したとしても、上記微振動の作用によって、異物が優先的に溢れ出すこととなるので、異物が前記接触部Ｃに供給されてしまうという事態は極めて生じにくくなる。したがって、ブレード２１で掻き取られたトナー（一次残留トナー）Ｔが感光体１０とブレード２１との接触部Ｃおよびその直下部Ｕに常時堆積される構成であるにもかかわらず、感光体１０表面あるいはブレード２１が紙粉等によって削られてしまうというおそれがなくなる。

【００３０】＜第２の実施の形態＞図３は本発明に係る画像形成装置の第２の実施の形態におけるすくいシート２２部分を示す拡大図である。同図において、上記第１の実施の形態と同一部分ないし相当する部分には同一の符号を付してある。

【００３１】この実施の形態が上記第１の実施の形態と異なる点は、すくいシート２２を、予め「く」の字型に屈曲形成し、その屈曲部２２ｄで像担持体１０に接触させるようにした点にあり、その他の点に変わりはない。この実施の形態によっても、上記第１の実施の形態による作用効果と同様な作用効果が得られる。

【００３２】＜第３の実施の形態＞図４（ａ）は本発明に係る画像形成装置の第３の実施の形態におけるすくいシート２２およびその支持部材４０を示す拡大図である。同図において、上記第１の実施の形態と同一部分ないし相当する部分には同一の符号を付してある。

【００３３】この実施の形態が上記第１の実施の形態と異なる点は、すくいシート２２を、像担持体１０との接触部Ｃ１近くにおいて像担持体１０側に向けて支持する支持部材４０が設けられいる点にあり、その他の点に変わりはない。支持部材４０は、紙面と直交する方向においてすくいシート２２と同じ長さを有する板状体であり、すくいシート２２の下部２２ａに対して接着層２９ａで固着されており、この支持部材４０が別の接着層２９ｂでケース２６の取付面２６ｂに固着されている。支持部材４０の上部４０ａは、像担持体１０との接触部Ｃ１近くまで延びており、すくいシート２２をバックアップしている。この実施の形態によっても、第１の実施の形態による作用効果と同様な作用効果が得られる。さらに、すくいシート２２が、像担持体１０との接触部Ｃ１近くにおいて像担持体１０側に向けて、支持部材４０で支持されているので、次のような作用効果が得られる。すくいシート２２を延設したトナー溜部（延設部）２２ｂ上にトナーが堆積される構成とすると、そのトナーの重量によって、すくいシート２２と像担持体１０の接触力が弱くなる傾向が生じる。これに対し、この実施の形態では、すくいシート２２が、像担持体１０との接触部Ｃ１近くにおいて像担持体１０側に向けて、支持部材４０で支持されているので、前記延設部２２ｂでトナー溜部が形成されているにもかかわらず、すくいシート２２と像担持体１０との接触部Ｃ１における接触力が確保され、トナーの漏れが確実に防止されることとなる。また、すくいシート２２に支持部材４０が固着されているので、すくいシート２２のよれも抑制されることとなる。

【００３４】＜第４の実施の形態＞図４（ｂ）は本発明に係る画像形成装置の第４の実施の形態におけるすくいシート２２およびその支持部材４１を示す拡大図である。同図において、上記第１の実施の形態と同一部分ないし相当する部分には同一の符号を付してある。

【００３５】この実施の形態が上記第１の実施の形態と異なる点は、すくいシート２２を、像担持体１０との接触部Ｃ１近くにおいて像担持体１０側に向けて支持する、上記第３の実施の形態とは異なる支持部材４１が設けられいる点にあり、その他の点に変わりはない。この実施の形態の支持部材４１は、紙面と直交する方向においてすくいシート２２と同じ長さを有する、略Ｌ字型の板状体であり、その下部４１ａが接着層２９ｃでケース２６に固着され、その上部４１ｂが、すくいシート２２を、像担持体１０との接触部Ｃ１部分よりも多少上方において支持している。支持部材４１の上部４１ｂとすくいシート２２との接触部は接着剤等で固着してもよいし、固着しなくてもよい。この実施の形態によっても、上記第３の実施の形態による作用効果と同様な作用効果が得られる。

【００３６】以上、本発明の実施の形態について説明したが、本発明は上記の実施の形態に限定されるものではなく、本発明の要旨の範囲内において適宜変形実施可能である。例えば、上記実施の形態では、像担持体が感光体である場合について説明したが、像担持体が中間転写体である場合にも本発明は適用可能である。また、上記実施の形態では像担持体（感光体）が円筒状である場合について説明したが、像担持体がベルト状である場合にも本発明は適用可能である。

【００３７】

【発明の効果】請求項１～４記載のいずれの画像形成装置によっても、クリーニングブレードの接触圧および／または接触角を増大させた場合でもブレードの捲れが生じ難くなる。また、クリーニングブレードのいわゆるスティックスリップなる挙動が安定し、結果として、クリーニング性能が一層向上することとなる。しかも、比較的小粒径のトナーが像担持体とブレードとの接触部に供給され易くなり、ブレードの捲れ抑制作用およびクリーニング性能の向上が、より一層良好に得られることとなる。さらに、画像形成装置の使用初期においてトナーが速やかに堆積されることとなる。さらに、請求項２記載の画像形成装置によれば、すくいシートと像担持体との接触部におけるトナーの漏れが確実に防止されることとなる。請求項３記載の画像形成装置によれば、ブレードの捲れ抑制作用およびクリーニング性能の向上が、より一層確実に得られることとなる。請求項４記載の画像形成装置によれば、ブレードの捲れ抑制作用およびクリーニング性能の向上が、より一層確実に得られることとなる。

【００３８】

【図面の簡単な説明】

【図１】本発明に係る画像形成装置の第１の実施の形態を示す概略正断面図。

【図２】第１の実施の形態の要部の拡大図で、作用説明図。

【図３】本発明に係る画像形成装置の第２の実施の形態におけるすくいシート２２部分を示す拡大図。

【図４】（ａ）は本発明に係る画像形成装置の第３の実施の形態におけるすくいシート２２および支持部材４０を示す拡大図、（ｂ）は本発明に係る画像形成装置の第４の実施の形態におけるすくいシート２２および支持部材４１を示す拡大図。

【図５】（ａ）（ｂ）は従来技術の説明図。

【符号の説明】

Ｔ　トナー

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１０　感光体（像担持体）
２１　クリーニングブレード
２２　すくいシート
２２ｂ　延設部（トナー溜部）
２２ｃ　先端部

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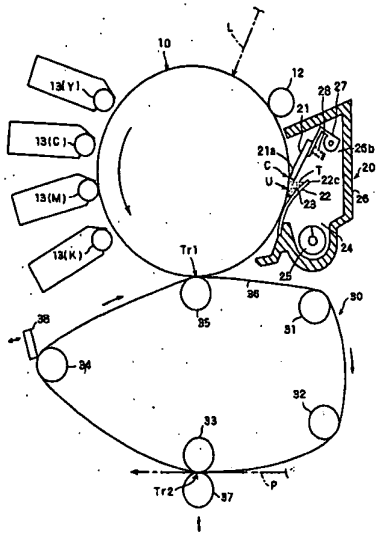
２６　ケース
４０，４１　支持部材
Ｃ　ブレードと感光体との接触部
Ｕ　直下部
Ｃ１　すくいシートと感光体との接触部

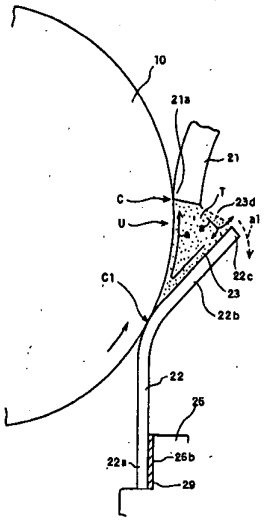
【図１】

７４１０９－１



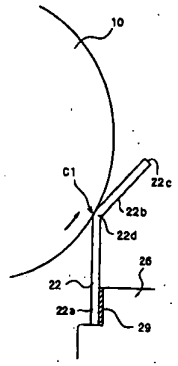
【図２】

７４１０９－２



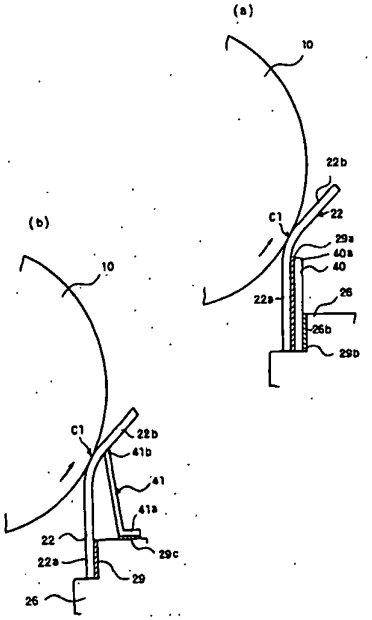
【図３】

７４１０９－３



【図４】

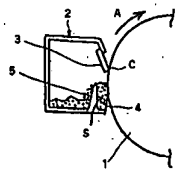
７４１０９－４



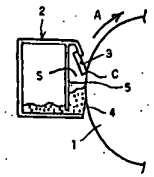
【図５】

７４１０９－５

(a)



(b)



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